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Things Which Live or Which Have Lived

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Journal of the Biological Photographic Association Vol. 21, No. 4 November, 1953

Photography of Paper Chromatograms*

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Introduction

PAPER chromatography is a technique of qualitative and quantitative chemical analysis used most often by chemists dealing with organic and biochemical preparations. Its use by inorganic chemists is more limited.

The physical appearances of chromatograms are those of pieces of filter paper of widely varying shapes and sizes, having large or small areas, which may be of a wide variety of hues, or may be visible only when viewed by ultraviolet induced fluorescence.

A paper chromatogram is made by placing a small drop of solution containing the substances to be separated near one end of a piece of filter paper. After the drop dries, the end of the paper nearest the spot is placed in a "developing" solvent so that the solvent flows past the original spot by capillary action, depositing the constituents of the spot in areas of various sizes, shapes, and densities down the length of the paper. This process usually takes place in an airtight cabinet in an atmosphere fairly well saturated with solvent vapors, and at a constant temperature. The process, in some ways, is analogous to fractional distillation. After this "development", papers are sometimes further "developed" by exposure to HCl or NH_3 vapors or by spraying with indicating dyes, in order to make the heretofore invisible spots visible under either visible or UV radiation[1].

Several methods for evaluating chromatograms are in use. Simple visual inspection is frequently used if the colors are sufficiently intense and the areas clearly enough delineated. Those which are fluorescent are viewed in darkened surroundings with an ultraviolet source and the areas then circumscribed with a pencil line. Many workers desirous of quantitative as well as qualitative results evaluate chromatograms with the aid of a densitometer. This technique has more recently been expanded and extended to include papers with fluorescent and UV absorbing areas. Visualization and measurement of papers of this type are considerably aided (as demonstrated by Price et al., in recent and as yet unpublished work) by use of suitable fluorescent screens.

Photographic Techniques

Since chromatographic phenomena are often transient, it is frequently desirable to make photographic records of them. As will be subsequently shown, some photographic techniques make evaluation and records of UV responsive papers extremely easy. The photography of chromatograms is also of value in presentation of findings for publication.

* Received for publication September 11, 1953.

The photography of colored chromatograms should not pose any special problems to a competent photographer. Uniform illumination and the proper choice of film and filter will give excellent results with a minimum of effort. No special filters are required, the ones common to technical photography sufficing. Some examples are shown in Figure 1.

Photography of UV responsive chromatograms, however, presents a variety of interesting problems—choice of film and filter, special sensitizing, choice of radiation source and method of employing it.

Various chemical compounds respond differently to ultraviolet radiation, the wavelength of the radiation being an important factor. The color of the fluorescence exhibited may run the gamut of the visible spectrum from violet to red, sometimes with several colors coexistent within the same compound.

The proper choice of source of ultraviolet radiation is of great importance. The fluorescence of many compounds is excited by very limited wavelength band widths. Thus, a source incapable of emission in the appropriate region of the spectrum is useless. The extremely short (10-200 millimicrons) and longer (200-300 millimicrons) wavelengths are emitted by mercury vapor tubes. Fluorescent lamps fall into this category but may or may not be suitable, depending on the lamp coating and glass absorption. Carbon arcs emit all over the UV spectrum, and incandescent lamps almost entirely in the long (300-380 millimicrons) wavelength region.

Most sources emit a considerable amount of visible radiation which, for photography or visual examination of fluorescent phenomena all but negate the effects of the UV. The radiation source then, must be filtered to remove visible radiation and pass ultraviolet. The filter may be an integral part of the source as in the so called "Black-Light" fluorescent tubes and incandescent lamps, or a separate filter such as the Corning 9863 (transmission 220-420 millimicrons) may be used. All short wavelength sources use a separate filter, which makes these sources costly.

Ultraviolet photography *per se* is rarely done since it requires a fused quartz lens system, optical glass being practically opaque to UV. Fluorescence photography has, however, been erroneously described as ultraviolet photography by some authors[6].

Material to be photographed may be "illuminated" in two ways: the first with the source in the conventional position in front of the chromatogram, and the second with the source in back of the paper. Even "illumination" is extremely important in this kind of photography, slight unevennesses producing grossly distorted tonal reproduction and heavy shadows. Transradiation is especially useful when the area to be photographed is small.

The choice of filter is determined by the hue of the fluorescence and the amount of visible radiation emitted by the source and reflected by the chromatogram and the slight fluorescence of the paper itself. A Wratten *K-2* filter usually takes care of this residual light, although there are times when a Wratten *G-15* filter may be necessary.

Exposures, especially with short wavelength radiation, tend to be rather long: in rare instances hours, more usually minutes. This of course depends to some degree on the lamp-subject distance. Long exposures should not be attempted in anything but a completely darkened

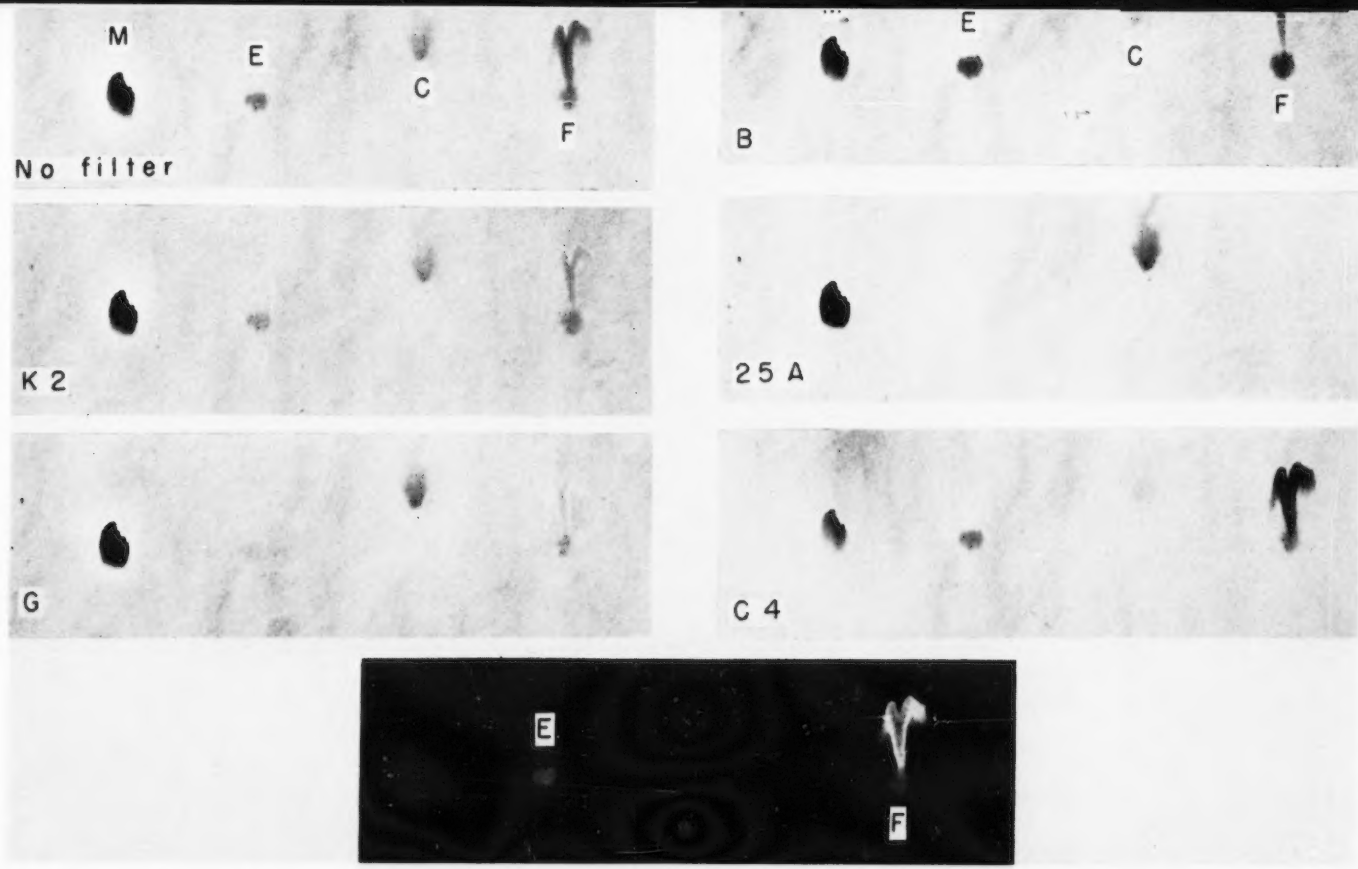

Figure 1. The same chromatogram photographed through different Wratten filters. The picture with the dark background was made with a 15 watt General Electric *BLB Black Light* fluorescent tube and a Wratten *K-2* filter. All photographs made on Dupont *Fine Grain Pan* film. The filter is indicated, lower left hand corner of each picture. The colored spots on the chromatogram, as marked in the figure, appear in white light as follows:

Legend	*Substance*	*Color*
M	Methylene Blue	Deep blue
E	Eosin	Pink
C	Copper Sulphate	Very pale blue
F	Fluorescein	Bottom portion, pink - Top portion, yellow

room. Exposures of 10 seconds or less may be made under a slightly less rigid condition. Usually, but by no means always, a high contrast film is recommended, and since a great deal of fluorescence is in the yellow, green, and red region of the visual spectrum, a film of panchromatic sensitivity is called for. The softest film, developer, and printing paper, within reason, should be chosen, since tonal gradation in the photograph is important. Extreme contrast is sometimes thoroughly undesirable, causing faint spots to disappear entirely, and giving a distorted impression of the size and intensity of others.

It is good practice to include a ruler or measuring scale in all chromatograms to be photographed. Scales and lettering can be drawn on fluorescent chromatograms either with fluorescent ink or paint, or with a 2 or 3% solution of eosin in water. When being photographed, chromatograms should be held as flat as possible. Most of them are buckled, and many have been folded as well. Fluorescent chromatograms should not be held down by a sheet of glass unless they are being transradiated, since glass transmits ultraviolet badly, if at all.

Good reproductions of chromatograms may be obtained with contact printing techniques. Markham and Smith[2] in an appendix to their paper describe a method utilizing a reflex document paper. Exposing photographic paper through a chromatogram in contact with it is a simple procedure both for colored and for fluorescent chromatograms. It is important to note that UV sources can be used for printing colored chromatograms as well as fluorescent ones. However, when an ultraviolet source is used, it should be remembered that glass cannot be used as an aid for maintenance of intimate contact between the photographic and the chromatogram.

As can be seen in Figure 2 perfect contact is impossible without resorting to some means other than reliance on the flatness and weight of the chromatogram. There are several ways of achieving perfect contact, one of the simpler of which is that of stretching the pair over a convexly curved surface. A ferrotype tin provides an excellent support of this type, its flexibility being a material aid to the stretching process.

In preparing the illustrations for this paper, the chromatogram was merely laid on top of the photographic paper. Contact between the two was entirely dependent on the chromatogram's own weight. This crude method was purposely used to illustrate more clearly the advantages of the following technique:

Ordinary photographic contact printing paper is briefly immersed in a weak solution of a fluorescent dye. (The example presented as Figure 2A was prepared with a 0.5% aqueous solution of eosin with a small amount of sodium carbonate added to provide an alkaline medium. Other fluorescent dyes can be used.) The paper is used wet or damp, separated from the chromatogram by a sheet of .0015" thick polyethylene. This material is transparent to the ultraviolet. Exposure is made through the chromatogram using an ultraviolet source. Development and fixation are by conventional means. The pink color imparted by the dye is removed, after preliminary washing, by a few minutes in a solution of an alkaline detergent, (e.g., Tide, Surf, Fab,) after which washing and drying are carried out in the usual way.

Many fluorescent dyes when applied over a gelatin emulsion will not fluoresce except in the presence of water. It is for

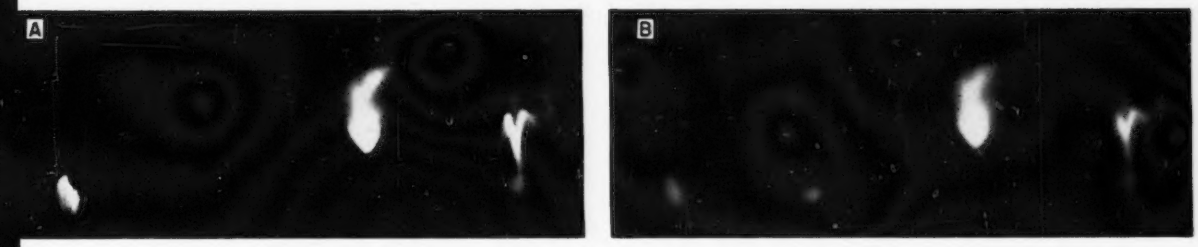

Figure 2. "A" was made with photographic paper treated with .5% alkaline eosin in aqueous solution subsequently decolorized in a very weak solution of a commercial laboratory glassware cleaner. "B" is a contact print made on untreated paper. The UV source was a portable *Mineralite* lamp. Artifacts demonstrated are the solvent front of the chromatogram and in "A" a bubble between the photographic paper and the polyethylene sheet.

this reason that the paper is used moist. The paper may be prepared beforehand however, dried, and rewet prior to using.

The idea of applying fluorescent substances to photosensitive surfaces is not a new one[3, 4, 5]. A great increase in clarity and contrast is obtainable with this method, even with the crude technique used to prepare the illustration for Figure 2A.

The concentration of the dye solution is not at all critical. Weak solutions work as well as strong ones, and working with them is much cleaner. Fifteen seconds, more or less, is sufficient to obtain optimal results.

It has been observed that exhaustion of the developer occurs sooner than it would with normal use when it is used for dye treated paper. It is unwise to wash other prints in the same bath as dye treated paper until decolorization has been carried out, in order to avoid undesirable staining.

There is no reason to believe that the techniques mentioned herein should be limited in their application to crhomatograms. They are useful in any instance where chemical deposition or recording on paper is carried out.

Summary

A brief description is provided of paper chromatography. Methods of photography by visible and ultraviolet radiation are discussed. Some sources of ultraviolet radiation are mentioned. Contact printing of chromatograms is described, and a new technique utilizing UV sources and fluorescent dye impregnated paper, is offered.

Acknowledgments

I am greatly indebted to Dr. T. D. Price of the Department of Urology for a generous amount of valuable information and advice, and to Miss Inge Futter who prepared the chromatogram used for illustration.

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Photography of Biological Materials Without a Camera*

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Introduction

A TECHNIQUE of photographing biological materials without a camera has been useful to the authors. Because the method might be utilized advantageously by other biologists, a description of the technique is presented.

A search of the literature reveals limited use of methods in biology where a camera is not employed. A description of photography of petri plates appeared as early as 1888. This, and other early descriptions, were summarized by Buchholz and Lewis[1], all of which involved the use of the petri dish in contact printing only. The petri dish, used as a negative, was placed on top of sensitive paper and an exposure was made. Buchholz and Lewis used this method to record results of water, milk and soil plates, effect of light, disinfectants and dyes on bacteria, bacterial antagonism, and the effect of bacteria on gelatin in Frazier's medium.

Technique

The technique here described is based upon the simple principle of using the biological specimen itself as a negative. The specimen is placed on the filmholder, or as a substitute for the filmholder, and then inserted into a photographic enlarger and focused directly upon sensitive paper or film.** Specimens such as microbial colonies on the surface of petri dishes are particularly suitable. In this case, the entire petri plate is placed in the photographic enlarger.

This technique has proved to be more useful than standard photographic procedures in several situations and for several reasons. First, adequate camera and lighting equipment for photomicrography is not available to every scientist, whereas almost every amateur photographer has an inexpensive enlarger that may be used in the procedure described. Second, the method is mastered within a few minutes; one does not need the skill and "know-how" of a professional photographer. Third, specimens are often the same color and shade as the background, as in the cases of bacterial colonies on an agar surface and of virus pock lesions on the surface of the chick embryo chorio-allantoic membrane; there-

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** The selection of proper photographic paper, film, and developer depends somewhat upon the taste of the worker. *F-4 Kodabromide* and similar papers give excellent contrast. For making lantern slides, or if it is desirable to make a negative so that several copies may later be reproduced, *Kodalith, Reprolith,* or *Photolith* will give highest contrast with no perceptible grain. Since much of the photographic work of the authors is not for publication purposes, but merely for recording results, they have found Remington Rand bond sensitized paper very easy to handle; it can be put into a notebook, written on with ease and folded just like ordinary bond paper.

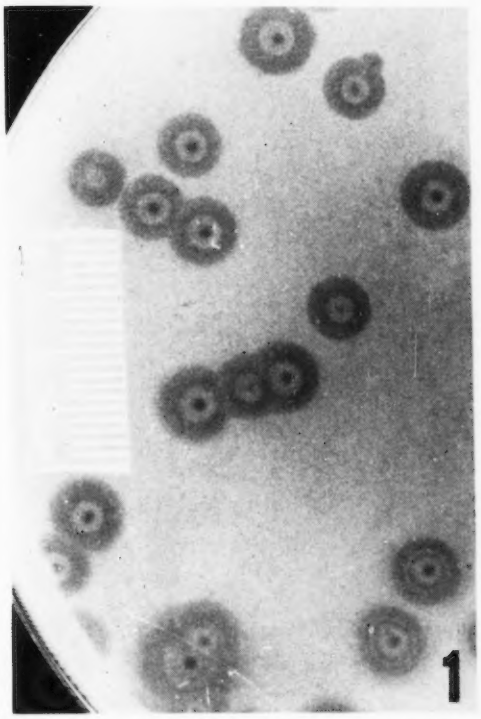

Figure 1. Edge of petri dish containing *Escherichia coli* bacteriophage plaques.

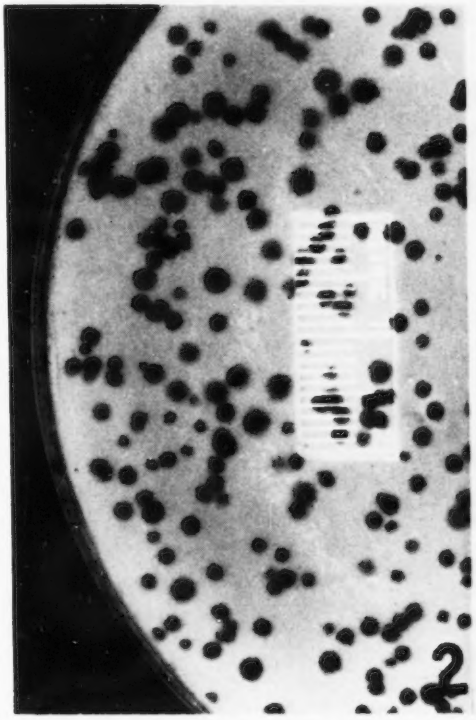

Figure 2. *Xanthomonas pruni* bacteriophage plaques.

fore, it is difficult to obtain sufficient contrast by direct photographic means. Contrast is easily obtained by the method described in this paper. Fourth, the method may be used with little interruption of laboratory experiments. The authors have often observed bacterial growth or phage plaques which they wished to record, left the laboratory for ten minutes or less to make a photograph and returned to continue their research. Such economy of time and effort is not possible wth conventional photography. Once photographed, cultures, specimens, etc., can be discarded. Fifth, the method may be used for low power magnification without the use of a microscope. For example, the lesions produced by certain viruses on the chorio-allantoic membrane of the chick are often minute and difficult to see. Details of these lesions may be observed readily by the enlargement produced by this procedure (Figure 5). Sixth, since no negative is employed, the sometimes disturbing factor of film graininess is avoided.

The procedure is used routinely in this laboratory for the recording of bacteriophage plaque types[2] (Figures 1 and 2), and the effect of antibiotic substances on bacterial growth (Figure 3). In this connection, the addition of an indicator substance to the culture medium will often markedly improve contrast. For example, the addition of 0.005% of the oxidation-reduction indicator triphenyltetrazolium chloride to the agar culture medium will cause bacteria of most species to turn red upon growth; thus, colonies or other areas of

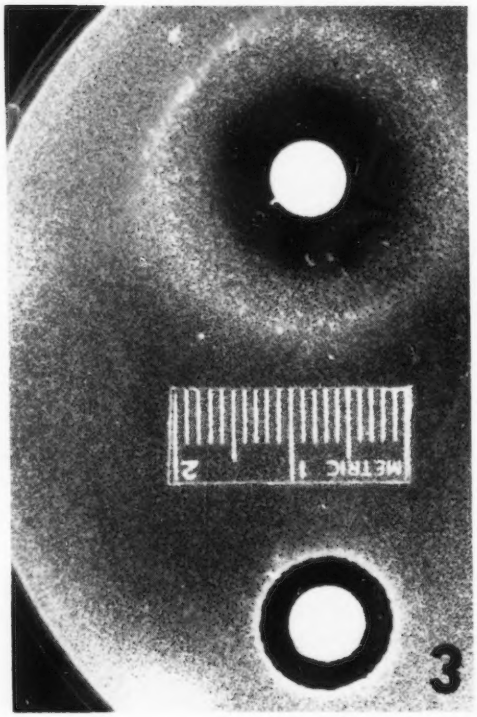

Figure 3. Antibiotic disks in seeded petri plate. Black zones surrounding disks indicate inhibition of bacterial growth. The light zones surrounding these indicate stimulation of bacterial growth.

(Figures 5 to 12 will be found on pages 10 and 11.)

growth will become red and areas of non-growth, such as phage plaques or inhibition zones, will remain colorless, giving a striking contrast. The indicator acts as a red filter, but only where active bacterial growth has occurred.

Another procedure that has proved helpful in the routine recording of results has been the placing of a section of a transparent ruler next to the biological specimen. This is especially useful in cases of enlargement. In regular photomicrography, specimen size is obtained only by the time consuming calibration of the microscope and calculation of exact camera magnification or reduction.

Success in the rapidly growing research field of microbial genetics depends in a large measure upon efficient laboratory procedures. The recording of variant phage plaque and bacterial colony types is an obvious application of the technique here described[3, 4, 5]. In addition, the following procedure has been helpful in the rapid screening of biochemical mutants of bacteria[6]. *Escherichia coli,* for example, normally will grow even if no organic nitrogen source is added to the medium. After irradiation, however, a few *E. coli* cells lose their ability to synthesize their own nitrogenous materials and now must be supplied with an organic nitrogen source, such as an amino acid, in order to grow. The described method of photography is helpful in selecting these few mutant bacteria. A small population of a mixture of non-mutant and mutant type can be plated out on a basal medium containing no organic nitrogen. The only colonies that will grow will be the non-mutant types, and a photographic record can be made of this petri dish. A thin layer of a medium containing organic nitrogen is then carefully poured on top of the plate, and the mutant types will be able to grow. After proper incubation, another photograph is made. The

mutant colonies may be readily distinguished from the non-mutant types by comparing the two photographs. This method avoids the task of marking each initial colony with a wax pencil, and the risk of smearing or erasure of markings. have uses elsewhere in biology.*

Although the descriptions above are of microbiological specimens, figures 6-12 illustrate that the technique might have uses elsewhere in biology.

This photographic technique is also a valuable teaching aid. Where actual laboratory exercises are not practical, or if the instructor wishes to demonstrate the desired results of a student experiment, sets of photographs of petri plates may be prepared and exhibited from year to year. Also, as in the case of virus lesions upon the surface of chorio-allantoic membranes, gelatin-formalized membranes may be placed between pieces of glass and the specimen used as a lantern slide[7]. This eliminates much time and expense of the conventional method of preparing lantern slides. In a similar manner, 35mm film may be exposed, one section at a time, in the preparation of film strips. Titles for such filmstrips are easily prepared by typing on a transparent paper called *Tracolene* (Transolene Company, Barrington, Illinois).

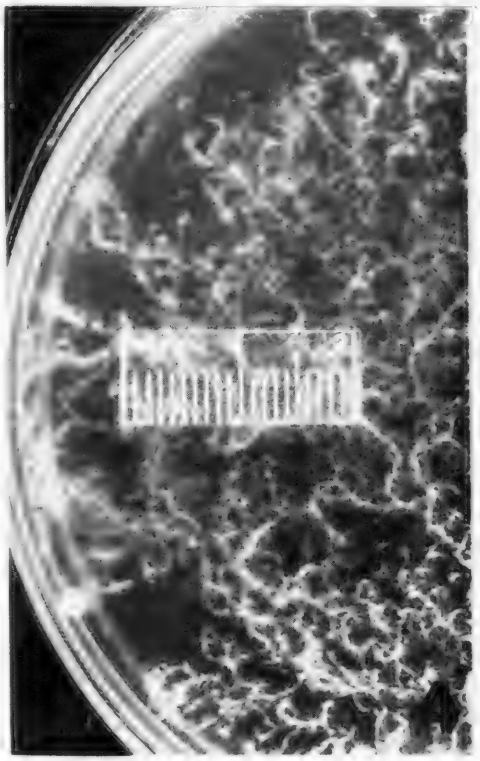

Figure 4. Mold mycelia which have spread over entire plate.

Summary

A technique of photographing biological materials without a camera is presented. The method is based upon the simple principle of using the specimen itself just as the negative would be used and focusing upon sensitive paper or film. This procedure has several advantages over conventional photography. The technique has been particularly useful in the photography of microbiological materials on the surface of petri dishes, but examples of uses in other fields of biology are also presented.

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* Neither a camera nor a microscope was used to obtain photographs shown in this report. There was a 1mm distance between scale markings on figures.

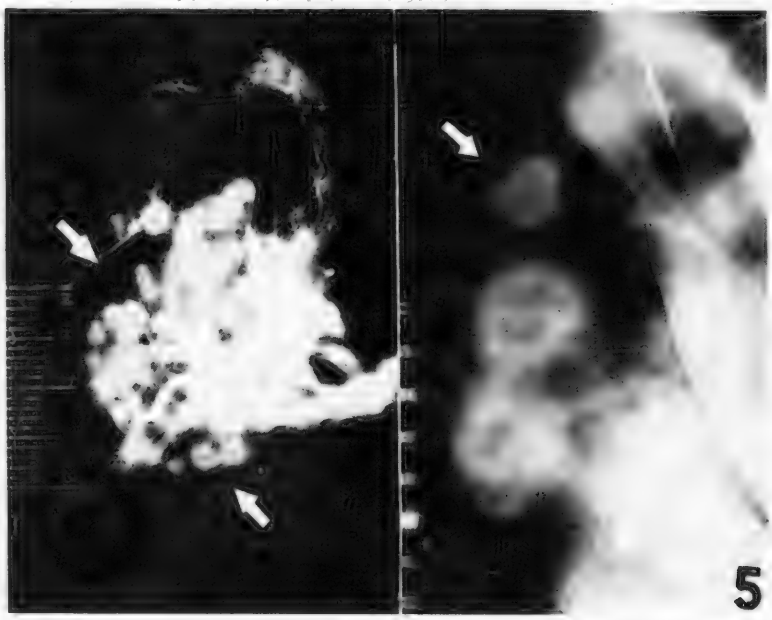

Figure 5. Chorioallantoic membranes of chick embryos, showing vaccinia lesions. Arrows point to typical donut-shaped pocks. Two different enlargements are represented above.

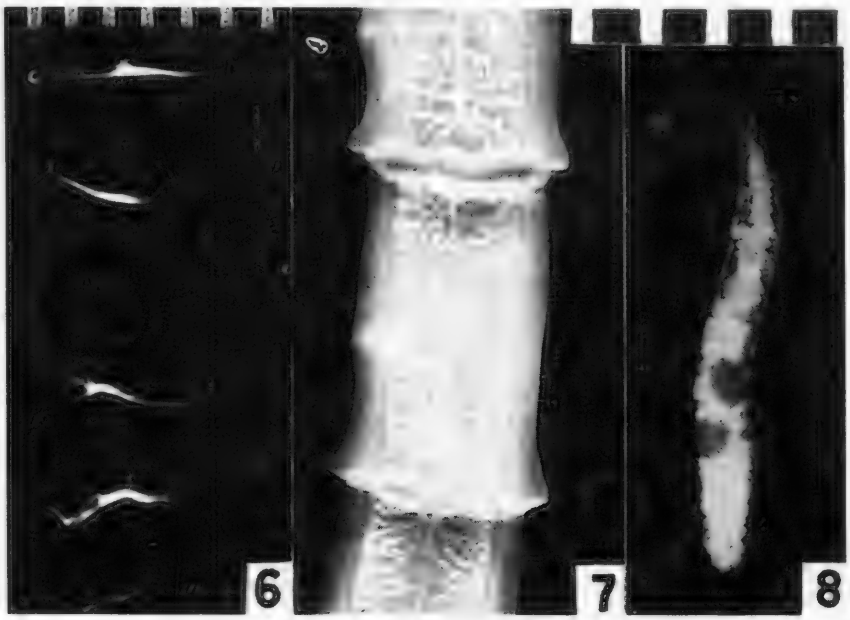

Figure 6. Pinworms, *Enterobius vermicularis.*
Figure 7. Tapeworm, *Taenia pisiformis.*
Figure 8. *Haematoloechus.*

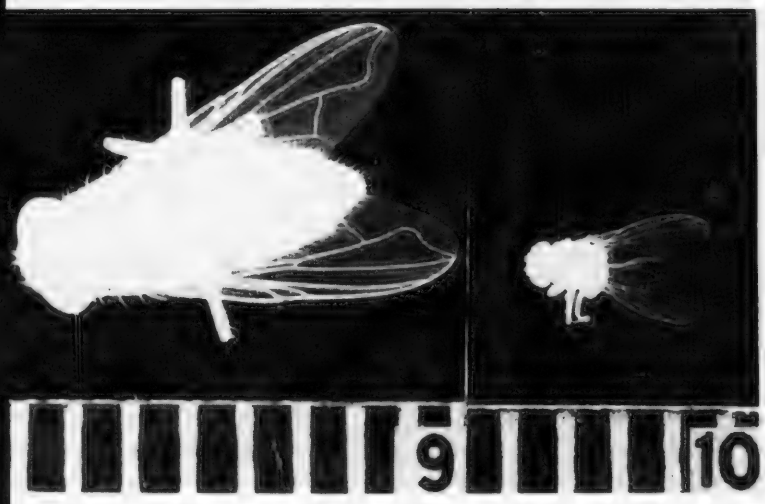

Figure 9. Housefly.

Figure 10. Fruitfly, *Drosophila*, used extensively in genetic studies. The wing structure, a good genetic marker, may be recorded when the fly is in this position. By proper positioning of the specimen, such characteristics as bristles, stuble, and reduced eyes may be recorded.

Figure 11. Section of rat lung.

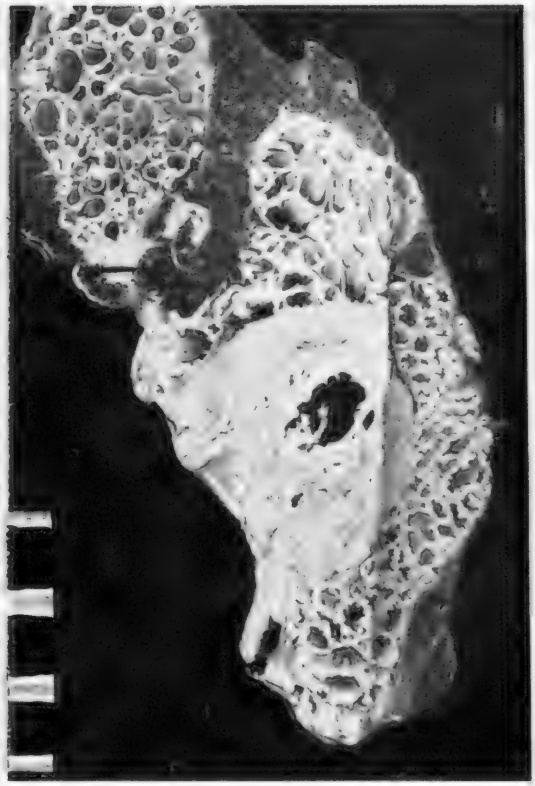

Figure 12. Section of rat prostate.

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A Stand for Camera and Cameraman In Surgical Movie Work*

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Introduction

THE camera stand to be described was created specifically to permit easy access to difficult camera positions in surgical movie making. It provides features which are absent, though desirable, in commercial stands in the low cost bracket. Unlike the camera stands which have been described in the Journal of the B.P.A.,[1,2,3] this is an easily copied design, the materials for which are readily available from hardware outlets and mail order concerns. The simplest of machine tools are required to fashion the metal parts in this design. Alterations in this design may suggest themselves to the builder, which might result in an even more versatile stand without undue cost increases.

Basic Requirement

The specific need in this hospital was for a portable stand that would provide a very steep camera angle over the operating tables for filming movies in deep vertical cavities, such as are seen in some kidney and heart operations. (The common wooden step ladder had been pressed into use on several occasions, but it was definitely makeshift and unsteady.) No attempt was made to supply a universal or all purpose stand, but an attempt was made to keep the cost low.

Description and Construction

An overall view of the stand is shown in Figure 1. This was originally a 20 ft. magnesium extension ladder consisting of two 10 ft. sections. These ladders are easily obtainable at a cost of around $40.00. The cutting and arranging of its parts into this form provides a firm support for two cameras or a camera and a light, as well as support for the cameraman. The top, sliding section will elevate the pan heads, in 6 inch increments to 9 feet above the floor. It has proved to be a safe support; at full extension it will easily bear a cameraman's weight on the top rung, where such weight would not ordinarily be applied. Contamination of the operative field is somewhat less likely with a plexiglass sheet in place below the cameras as shown. Note that the base section of the ladder projects up to or under the base of the table, but this has not proved to be a hazard to the surgeon's movements. The boom spotlight is favored for small areas and deep cavities because it can so easily be positioned near the lens.

Another position is one easily reached with a regular tripod (Figure 2) but this stand offers the advantage of a high comfortable position for the cameraman. The surgical team has good freedom for action and the stand may easily be draped with

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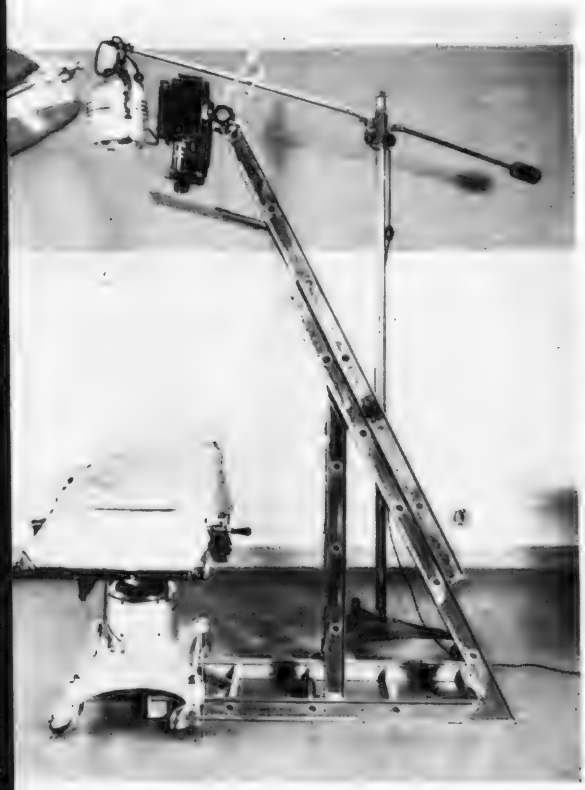

Figure 1. Overall view of stand.

sterile sheets. A further refinement is provided by the addition of a platform (Figure 3) which may be hung between any two rungs. The spring driven pins shown here permit adjusting the sliding half of the ladder to any height desired. The holes shown are placed at 6 inch spacings. The regular rung hooks were removed entirely.

Joining of the various parts was accomplished using aluminum plates and bolts, and nuts without welding. Pan heads were attached on each of the ladder rails, using pieces of right angle aluminum. (Figure 4) These are *Quick-Set-Senior* tripod heads. The nearer one was machined off to allow use of the Kodak *Cine Special* camera. The value of having a still camera so easily at hand during a movie job has been expressed many times here, but others may find the second head desirable for mounting a light or another motion picture camera. The arrangement of the sliding parts of these magnesium ladders is revealed here, explaining the ruggedness of the stand at any extension.

Details of the cutting process and the arrangement of the parts are shown in Figure 5 for those interested in duplicating this stand. The longest and shortest of these sections were cut from one of the 10 ft. lengths. The 64° angle was chosen quite carefully to permit surgeons to stand directly under the ladder. A lesser angle would tend to prevent this and would also require a longer base to avoid tipping.

Possible Modifications

This stand has been in use since 1948, during which time several modifications have suggested themselves. Among them

Figure 2. Stand in use, showing cameraman in comfortable, convenient position.

Figure 3. Platform addition, hung between two rungs.

Figure 4. Pan heads on rails.

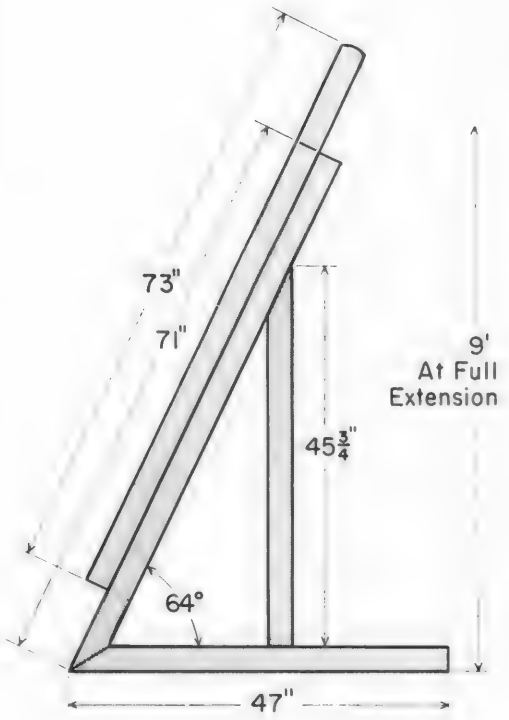

Figure 5. Arrangement of parts.

have been the ideas of varying the pitch of the ladder, adding wheels, and a storage shelf for films. Some thought was also given to adding a fixed position speedlight for the still shots. None of these has seemed worth the extra cost. Including the price of ladder and labor, this stand cost $81.00 in 1948, which was a modest price for serving a specific need so well.

Summary

An operating room camera stand has been desribed which offers the advantages of a dual support for movie and still cameras, support for cameraman, and the ability to reach very steep angles for deep vertical cavity work. In addition the stand may easily be duplicated at low cost by any machinist.

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A Method for Multicolor Radiography*

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Introduction

DONOVAN[1] has suggested that since X-rays of differing kilovoltages have different penetrating power, radiographs of the same subject may be treated as separation negatives and a composite radiograph produced by superimposing colored images. The technique suggested was found to be unwieldly and costly.

Since Donovan's theory is correct and of value, a method for multicolor radiography applicable to American techniques of color printing was developed in our color laboratory.

Theory

The ability of X-rays to penetrate a subject is dependent upon their "hardness". The higher the kilovoltage, the shorter the wavelength and the harder the rays. The harder rays pass most easily through the subject. If it is desirable to delineate different types of material making up the subject, a normal radiograph may first be made, followed by a second by means of softer rays.

The resultant films are copied photographically and these intermediates are treated as separation negatives which are printed by the dye transfer method. Should the image representing the soft radiograph be printed in a color complementary to the image representing the normal radiograph, delineation is accomplished by variation in gray density and color.

Description of Technique

The subject used was the abdomen of a patient. Immobilizing the subject, two exposures were made by the Potter-Bucky method. Readings were 100ma, one second and 17cm deep. The first was at 65kv and the second at 50kv, both by screen. Radio-opaque markers were included near the edge of the film to assist in registration later but this was found to be unnecessary.

The 14 in. x 17 in. film was developed normally. For the intermediates, 8 in. x 10 in. plates were chosen to minimize shrinkage. The first radiograph, or normal exposure, was photographed on an immobilized, standard x-ray viewer by an immobilized camera. Readings were 225 foot-candles per square foot, lens 12 inches and bellows draw 18 inches. Kodak 33 *Plates* were chosen to retain the full tonal range of the original without masking. Exposure was $4\frac{1}{2}$ seconds at an indicated f/32 and the plate was developed for $7\frac{1}{2}$ minutes at 20 C in D-76 with constant agitation. The first radiograph was removed from the viewer and the second substituted without undue attempt to effect registration.

For the second copy Kodak *Panchromatic Plates* were chosen in order to obtain good separation and contrast. Exposure was 2/5 second at an indicated f/32 and the plate was developed for 8 minutes in D-11.

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These intermediates were then treated as separation negatives and the standard dye transfer method (with slight modification) was employed for printing. *Pan Matrix* film was used instead of regular matrix film since it was found that better delineation resulted. If greater contrast of the second printer is desired, the second matrix may be developed separately to greater contrast.

Registration was accomplished visually and the Kodak matrix punch used. In printing the matrices, dyes forming an anaglyph spectrum were used. The first matrix was dyed reddish-pink in a dye made as follows: 10ml magenta dye, 15 ml magenta buffer, 5 ml yellow dye, 7.5ml yellow buffer and water to 500ml. Two per cent highlight reducer was used. The second matrix was dyed blue-green in a dye made as before but substituting cyan for magenta. Six per cent highlight reducer was used.

Summary

Since X-rays of varying intensities penetrate different depths of tissue, two (or more) exposures may be made of the immobilized patient in the normal manner. The resultant films are copied onto matrix material and dye transfer prints produced. The finished color print is a combined x-ray duplicate with each color corresponding to one x-ray intensity. The technique may be given industrial or other application.

Acknowledgments

I am very grateful for the advice and assistance offered by Dr. Evelyn Siris Levitin, who supplied the experimental radiographs, and Dr. Louis King, who gave encouragement. Both are on the staff of Childrens Hospital, San Francisco. Thanks are also due Loren Smith for valuable assistance with the photographic problems encountered.

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EDITORIAL ANNOUNCEMENT

By action of the BPA Board of Directors, future numbers of the Journal will be reserved almost exclusively for the publication of papers. A special news bulletin containing general association news, activities of members and chapter news will be mailed separately, in between the quarterly mailings of the Journal. Only official association announcements and matters of historical significance will be published from now on in the Journal proper.

Direct Printing in Electron Microscopy by the Diaversal Process*

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Introduction

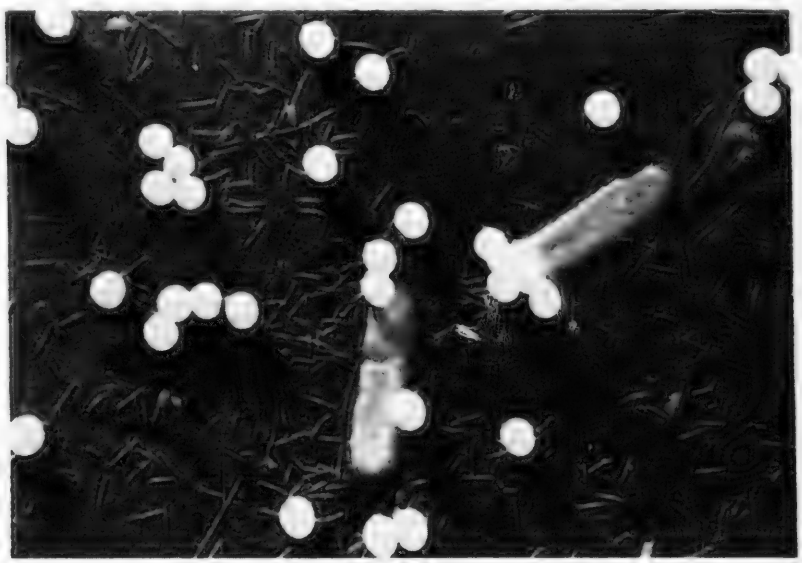
Electron microscope prints of unshadow-cast specimens are made directly from the same negative on which they were recorded. Those of shadow-cast specimens must be made from a copy negative, or by a direct printing process which will cause a reversal of the image[1]. One direct printing process has been reported[2]. Another, but quite different direct printing process, is the Gevaert *Diaversal Process* primarily developed for the direct printing of color film. However, its application to printing shadow-cast pictures in electron microscopy produces prints of superb quality.

Method

There are four steps in the process, one of which is to wash off the original image in warm water. The reversed print which remains is quite indistinct and must be intensified by toning. This toning not only brings out the minute detail, but is an added control for the final quality of the print. The four steps are develop, reverse, wash-off, and tone. All but the first step and half of the second are carried out with the room light on. Any standard developer can be used, but developer comes with the developing set. As the formulas have been published, it can be compounded or bought in kit form.

Selenium toner comes with the kit and works faster than gold toner. The choice of the final color, then, is up to the operator*. The total processing time including washing, should be under ten minutes. This

* Although blue and brown tones can be obtained readily, a print which is virtually black and white can also be obtained. If the blue or brown print is considered a disadvantage for reproduction, or undesirable from a mere personal standpoint, then the following procedure of double toning should be carried out. First gold tone the print to a light blue and then selenium tone it until only a faint trace of the blue remains. Upon drying this darkens slightly and produces a nearly black and white print.



Above illustration reproduced from a blue toned Diaversal print.

* Research supported by Armour & Company, Chicago; The American Heart Association; The Muscular Dystrophy Association; The Association for the Aid of Crippled Children. Received for publication July 1, 1953.

Above illustration reproduced from an almost neutral black and white toned print.

is because the customary fixing and washing is eliminated, and the process becomes a rapid one indeed.

The liquid concentrates which are bought in kit form are to be diluted 1:7. An individual plastic measurer comes with each bottle and one simply pours it out in the ratio of 1:7. The one gallon powdered kit makes up into a stock solution which is to be diluted 1:3. The reversal bath also requires the addition of a powdered packet which is dissolved just before use. The reason is that this solution does not keep well once mixed.

The *Diaversal* paper has a medium fast speed, being about as fast as bromide projection paper. It is sensitive to blue light and slightly to green light. Hence, the yellow-green safelight is satisfactory.

Exposure and Contrast Control

The *Diaversal* paper reverses the image, therefore, the exposure and contrast control are just the opposite of ordinary enlarging. In this process the longer the exposure the lighter the print becomes. To increase print contrast, the paper is over-exposed and under-developed. By underexposing, overdeveloping and giving slightly less reversal and toning, the contrast can be reduced considerably.

The print is developed for one minute, put in the reversing bath for two minutes, without rinsing, and then washed off and toned. The room lights can be turned on after the first minute in the reversal bath and the rest of the process carried on in normal light.

A good temperature range for washing off the top layer is 85-100 F. However, if it feels hot, but is still comfortable to your hand, it should work all right. A sponge or cotton is quite satisfactory for washing off the top layer as it swells. Because this process leaves a trace of tone in the highlights the density range is extended and contrasty negatives can be printed without difficulty. Not only is time saved in washing the print, but the elimination of the intermediate negative is an extremely desirable feature.

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Photographic and Photometric Processes in Cytochemistry*

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IN postulating that the cell is the basis of normal and pathological physiology of the organism, Virchow set the goal for histology and cytology: to localize the important metabolic substances within the cell and to determine the changes in these substances in health and in disease. Unfortunately, these sciences were early sidetracked into purely morphological studies. Recently, with the advent of new apparatus and new technics, renewed interest in this dynamic approach has resulted in the establishment of a new science, cytochemistry. Some photographic and photometric methods are of particular promise and importance in this current development.

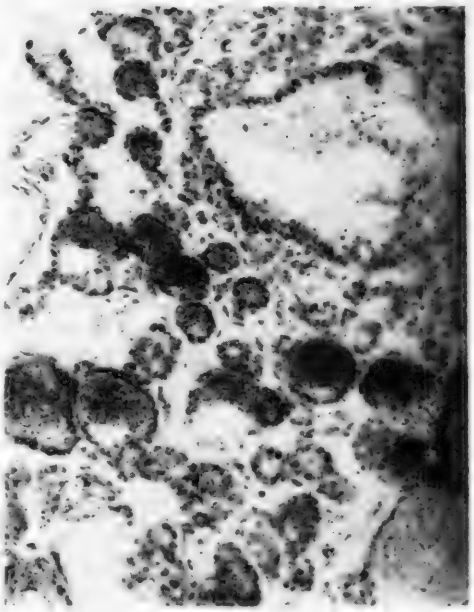

Figure 1. Radioautograph of thyroid prepared by the LeBlond method.

Radioautography

In 1896, Becquerel found that a photographic plate is darkened if it is placed close to uranium. This observation led to the discovery of radioactivity and of the nature of the alpha, beta and gamma radiations. Radioautography is based on Becquerel's discovery, and by its means we are able to make visible under the microscope sites of radioactivity in the tissue too small to be detected by the Geiger counter. Primarily we depend upon beta particles (electrons) to activate the photographic plate.

Three methods are in common use for the application of radioautographic technique: the contact method in which a block of tissue or a section is placed in contact with a photographic plate; the strip method developed by Boyd and Williams[3] and Pele and Howard[20] in which a strip of emulsion is wrapped around the slide on which a tissue section was previously mounted; and the coated method developed by LeBond, Percival and Gross[14] in which the liquified emulsion is painted over the tissue section. All these processes are initiated in the dark room . The slides are then placed in a light-proof container and then stored in the refrigerator for the optimum time of each substance being studied. After being developed and covered, the slides are studied under the microscope and the radioautograph compared with the tissue.

Lacassgne and Lattes[13] made the first radioautograph by placing a slice of bone in contact with a photographic plate to study the uptake of polonium. But it was only with the coming of the atom bomb, and its resultant large supply of many radioactive substances that this process has become important. The four most important radioactive substances are: iodine (I^{131}) with a half-life of eight days; phosphorus (P^{32}) with a half-life of fourteen days; carbon (C^{14}) with a half-life of 5,100 years; and nitrogen (N^{15}) which has a short half-life. Others are used too, for special problems.

Tumors and other actively metabolizing tissues show a high uptake of phosphorus, followed by liver, spleen and lymph nodes. Dols, Jansen, Sizoo and Van der Moos[7] used radioactive phosphorus to study normal and pathological bone formation. Calcium and strontium have been used for this purpose also. As a

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result, we have a more complete picture of this process and of the part played by mineral salts, vitamins and hormones.

Hamilton, Soley and Eichorn[12] used I^{131} to study human thyroid pathology. They found that hyperplastic thyroids showed very high iodine uptake and therefore would lend themselves to radioactive iodine therapy, but that carcinomatous thyroids did not concentrate iodine and therefore were resistant to this type of treatment. However, other workers have shown that after the administration of thiurocil there was an increase in iodine uptake in some thyroid tumors. Figure 1 shows a radioautograph prepared by the LeBlond method. The normal follicles show iodine uptake but the pathological tissue does not. This illustration also shows the advantage of the use of beta rays in contrast to alpha rays. The silver tracks are clearly localized.

In 1943 LeBlond studied the uptake of iodine in normal rats. He found that the radioactive iodine was quickly concentrated in the cytoplasm of the thyroid cells, but after two hours, the iodine had migrated from the cells to the follicular colloid from which it was removed by the blood. In man the rate of transfer is slower than in the rat.

Studies have been made on the embryological development of the tadpole thyroid and the onset of iodine concentration determined.

Numerous studies are being made on protein and carbohydrate metabolism using radioactive tracers. This is a field in which only a beginning has been made and which promises to throw much light on intracellular processes.

Light Absorption Studies

Different substances show distinct patterns of spectral absorption. The cytologist is beginning to take advantage of this characteristic to study the substances within the cell, using not only the range from ultraviolet through visual rays [21, 22] to infrared[17], but also including X-rays. He is using various types of reflecting[7] as well as refracting microscopes[11] for this purpose. By these means we have obtained independent proof of the dipolar nature of amino acids: information on the orientation of C=O and N—H in sugars and proteins: and identification of different amino acids and saccharides in the cell. Based on the pioneering efforts of the biochemists and biophysicists, this approach is now being applied to the study of numerous problems in the cell.

Caspersson[1] at the Karolinska Institute developed a practical ultraviolet microscope which he used both photographically and photometrically for the study of ribonucleic acid. Normal, regenerating, and tumorous tissues were examined. His conclusions were that ribonucleic acid is intimately associated with protein synthesis. In those cells that are actively producing protein, there is an abundance of this material in the nucleoli and in the cytoplasm. It seems to arise in the heterochromatin, accumulates in the nucleoli and then migrates out of the nucleus into the cytoplasm where it becomes a secondary center of protein production.

Some of Caspersson's coworkers studied the Nissl's bodies of nerve cells. Gersh and Bodian[10] studied this substance too, with a simplified ultraviolet microscope. During nerve transmission, the ribonucleic acid of which the Nissl's Bodies are largely composed decreases in quantity. During the recovery period, the ribonucleic acid is produced in the nucleus and then migrates into the tigroid bodies in the cytoplasm.

Gersh and Baker[9] described the formation of thyroglobulin in the thyroid follicles. This work is a valuable supplement to the radioautographic studies of the thyroid gland.

Mirsky[20] studied the changes in distribution of desoxyribonucleic acid, the major constituent of chromosomes, through the mitotic cycle by means of absorption. This work was complemented by Stowell's[21] microspectrophotometric studies in the visual range. Methyl green visualized the phosphoric acid fraction of the nucleic acid and Feulgen's leuco-fuchsin visualized the sugar fraction. They were able to show that the actual increase in chromatin (D.N.A.) occurred in the metaphase, not the anaphase or prophase, preceding cell division. The amount of desoxyribonucleic acid is constant for all the somatic cells of the organism, showing no quantitative differentiation. This quantity is twice as large as that of the egg or sperm and half as large as that of tetraploid cells found in tumors, etc. The method by which genes, largely composed of desoxyribonucleic acid controls all differentiation still remains to be elucidated.

Infrared absorption studies[16, 17, 18] are increasing at a great rate. Various types of reflecting microscopes are in use for this purpose. In many cases this method supplements

ultraviolet absorption studies for the determination of the structure of proteins[11] and polysaccharides[5, 11]. Barer and his coworkers[1] were the pioneers in this field. Wood[25] has studied single muscle fibers and described the absorption bands at 7.10, 7.65 and 8 microns in addition to the absorption bands of protein in the visual spectrum. Levine[15] and his coworkers have identified glycogen in whole bacterial cells.

With the introduction of a universal microscope which can be used throughout the whole range from ultraviolet through infrared, we can expect a larger number of workers to enter this intriguing field of investigation.

One of the promising developments is the use of x-ray absorption studies. Kirkpatrick has produced an x-ray microscope. But Engström[8] and his coworkers have developed an ingenious method, similar in some respects to radioautography. The tissue to be studied is placed in contact with a photographic plate such as the Kodak *Spectrographic Plate* by means of which a resolution of 1 micron can be obtained. The tissue and the emulsion is exposed to a source of soft X-rays of a suitable wavelength such as the Machlett tube with a beryllium window, a few millimeters in thickness. The x-ray absorption pattern can then be magnified through the microscope and photographed. By these means atoms of an atomic weight of twenty and higher can be identified and the quantity calculated to limit of 10^{-12} grams.

From the above brief summary, we can see that the cytologist now has new photographic and photometric methods which should be of great assistance in supplementing other histochemical means in elucidating some of the fundamental physiological processes that occur in the cell in health and disease.

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A Simple Reflector for Cavity Illumination*

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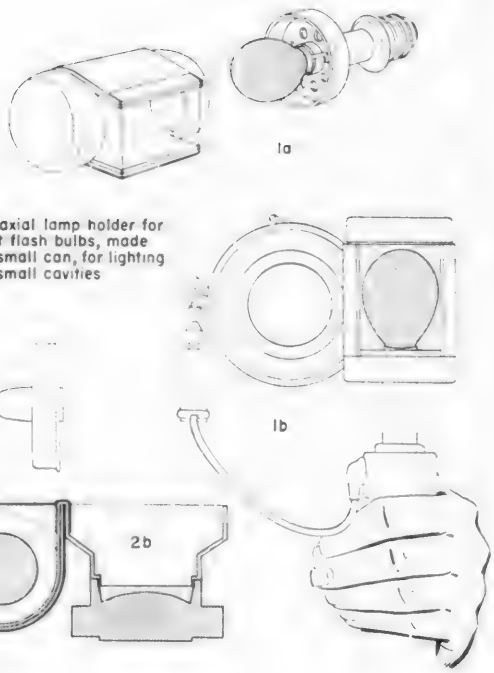

THERE have been many devices and methods produced in the past for the illumination of deep cavities for still photography. Most of these have had the serious disadvantages of being cumbersome and requiring special lamps, or have been costly to purchase and operate.

The reflector described here is inexpensive, simple, and utilizes ordinary midget flashlamps. It has been made in various forms by the author, who is not a skilled mechanic, and one has been in constant service over the last five years. This device can be used with any of the existing cameras in common use and can operate with either open or synchronized flash techniques.

The basic principle involved is near-axial illumination. In fact the light can be used immediately adjacent to the edge of the lens itself, without any resultant cutoff of field. It has been hand held and affixed to a lens hood, in both of which the position can be oriented in a 360 degree relationship with the optic axis depending on the relative angle of illumination desired to show form or texture.

The greatest amount of utilization has been in intra-oral photography in both monochrome and color. Flat lighting is avoided, and texture can be shown while illuminating the cavity to a high level of intensity. Excellent photographs of the anterior segment of the eye have been made, since the reflex highlight on the cornea is very small due to the small size of the light source itself. The operation has been consistently dependable, uniform, and simple.

The construction requires a minimum of fabrication. A small can such as a baking powder can, typewriter eraser container or other small can with a metal lid will do nicely. The can is cut as indicated in the illustration and the cut surfaces bent out to form "barn doors". These may be reinforced with another piece of material if necessary. A piece of thin plastic or clear sheet film is cemented over the opening between the flaps for protection of the subject in case of lamp explosion. Note that the ends are left open for escape of hot air when the lamp is fired. The inside reflecting surface can be lined with kitchen-type aluminum foil for greater efficiency. The lid is then drilled with a hole large enough to admit a midget lamp adapter. This can be purchased at any photo-supply store for less than a dollar. The neck of the adapter is inserted far enough to center the lamp in the opening cut in the can, and then soldered or cemented in place.

The lamp is now ready for use. It is loaded with a flashlamp by sliding the lid off the can, and replacing for use. The base of the adapter can be inserted into a flashgun socket, or if the end is wired with a male plug, this can be plugged into the receptacle on the battery case. An open or synchronized flash exposure may be made, depending on the camera equipment in use. The battery case may be hand held for positioning of lamp or the reflector assembly clipped on to a lens hood in correct orientation for the exposure.

* Received for publication April 13, 1953.
** Now at Kingsbridge Veterans Administration Hospital, Bronx, N.Y.

Above shows small size of highlight on cornea. Upper right shows illustration to entire depth of mouth.

1a (left) shows exploded view of device with screw base. 1b shows typical operation. 2a shows fitting with cord and plug. 2b shows method of clipping device to standard lens hood so that hands are free.

Example of texture rendition control.

Penetration of light into small cavity.

The Fragmented Approach In Visual Education*

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Introduction

ON October 9, 1953 at the Clinical Congress of Surgeons, held in Chicago and sponsored by the American College of Surgeons, the writer showed a fifteen minute color film having English and Spanish titles which demonstrated what is meant by the fragmented approach in visual education. The film portrayed the anatomy of a fresh surgical specimen removed for carcinoma of the bladder. The specimen consisted of prostate, seminal vessicles, vas deferens, portions of both ureters and the accompanying nerve and blood supply of these organs.

The interest shown in this type of approach has been considerable. This was manifested particularly by inquiries from both the Press and fellow members after showing the film at the American Urological Association meeting in St. Louis in June.

The author of the film first saw its possibilities as an instructive medium following his attendance at a meeting of educators interested in visual education while the American College of Surgeons were having their meetings in New York in 1952. Jenkins, Chairman of the American College of Surgeons Motion Picture Committee, portrayed graphically before the group, using less than fifty feet of color film, the anatomy and pathology, as well as pictorial indications, of how an eroded vessel bleeds within a duodenal ulcer. His demonstration made a definitely favorable impression on those present.

Need for Fragmented Approach

The medical curriculum in our medical schools has increased many fold in the last ten years. The time actually available to both student and surgeon, however, remains the same. This argues for compact highly instructive films of the fragmented type to aid both the pupil and instructor. Films used in this way will not supplant printed literature, but rather will facilitate its more rapid understanding.

The great value of the fragmented approach in visual education, while not so named, was proved in our last wars' *Air Force* and *Engineering* schools. Through their use the actual training time was cut anywhere from 50 to 25 per cent.

With the vast improvement of our methods of curing and treating disease there is ever a dearth of available surgical material when it is needed for demonstration purposes. Even the largest clinics with the most varied cases are not infrequently handicapped by the lack of what is called the "Typical Case." An available demonstration film of the case or specimen in point would be most valuable.

Advantages

Specimens removed in the operating room may be immediately photographed in their natural colors. Specimens placed in bottles and so preserved lose color or become dust collectors and lost on the shelves of pathological laboratories. Recently specimens have been placed in a deep freeze compartment for extended periods of time, but their use for demonstration purposes is limited, because they not only lose their color, but structures are destroyed through manipulation by the student and the demonstrator. On the other hand, if a film had been made originally, the specimen would have become a permanent record that could be used over and over again to benefit thousands of students. The same film could be used for review, tutoring and repetition.

With the use of the fragmented approach the instructor may record either a factual subject or an extremely technical detail. Either subject may then be used over and over again for the purposes which best fit the instructor's immediate needs.

* Received for publication November 7, 1953.

Preparing Exhibits*

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SCIENTIFIC photographers and artists should think of each other as fellow workers, rather than members of two distinct professions, because their business, basically, is the production of illustrative material for communicating knowledge. That they use different implements to produce pictures is of secondary importance. Both groups find themselves working on the same projects, for the same authors, and with identical problems.

One such project is the making of scientific exhibits. For an exhibit to be successful, regardless of its cost, size, or style, the concerted efforts and cooperation of author, designer, photographer, and technician are required. The ideal procedure is as follows: (1) Many weeks or months prior to the exhibition date, have the author submit a well-planned outline for discussion and amplification. The final text, brief and neatly typed, should follow quickly. (2) The designer should make a drawing to scale of the entire display. (3) The boothsize, photographs, illustrations, lettering, and models can then be ordered or made up, their dimensions determined by the scale drawing. This is the procedure of choice. But to be practical, let us consider what actually occurs.

Many scientific organizations mail their exhibit literature late. A couple of months may seem adequate to the society; but to the understaffed art and photography departments where material is prepared for many conventions and special exhibitions, the allotted time is not enough. The tempo of modern living is such that even the most conscientious of authors is likely to procrastinate until the last week and then dash in to announce how much space he requested and secured. That the walls have a limited amount of usable square footage (Figure 1) and that his selection of size may be wrong rarely occurs to him. If the space is too small, he is defeating himself; if it is too large, he is depriving another exhibitor of space.

If the author presents his story in written form, invariably it is too long. It may be a mass of disconnected, confused ideas floating around in his mind, or it may be a mass of illegible notes. Also, he invariably has a heterogeneous collection of photographs and drawings which he intends to use—some good, some bad — and all the wrong sizes for display purposes.

Sometimes this sad tale is presented to the medical photographer. Usually it is the medical artist who must create from this disorder an artistic, forceful teaching unit that will suitably fill the booth. Giving the author courteous advice on the correct procedure may be helpful if he ever attempts another exhibit. It has been noted, however, that, with a gleam in his eye, he usually appoints an unsuspecting, inexperienced resident or junior associate to prepare his next display! Consequently the medical artist or the photographer finds himself continually working with the uninitiated.

Obviously the only realistic solution is to be trained and disciplined to accept the situation graciously. The easy "out" for the scientific photographer is to send the author to a medical artist experienced in organizing exhibits. Occasionally the photographer is unable to secure an artist's services and is forced into the role of designer or author's assistant.

Let us now consider each of these questions.

WHAT IS AN EXHIBIT? An exhibit may be defined in many ways. One might say it is "a visual presentation of only the pertinent facts on a particular subject," or "a short story dramatically portrayed with the use of various visual aids," or "a teaching vehicle," or "a thought stimulator," or "an ethical form of advertising." One may choose whichever definition he prefers. How to present the message visually is the problem confronting us.

WHAT FACTORS MAKE A GOOD EXHIBIT? Seven ingredients properly combined make a successful exhibit. They are:

(1) Good Organization. The theme should unfold logically and with sufficient clarity to be understood when the demonstrator is absent.

(2) Text. To be appreciated by the footweary visitor, the text should be concise. It should have a few main headings to guide the viewer and some catchwords or phrases to attract and hold his attention. Whether or not the substance of the text is worth the produc-

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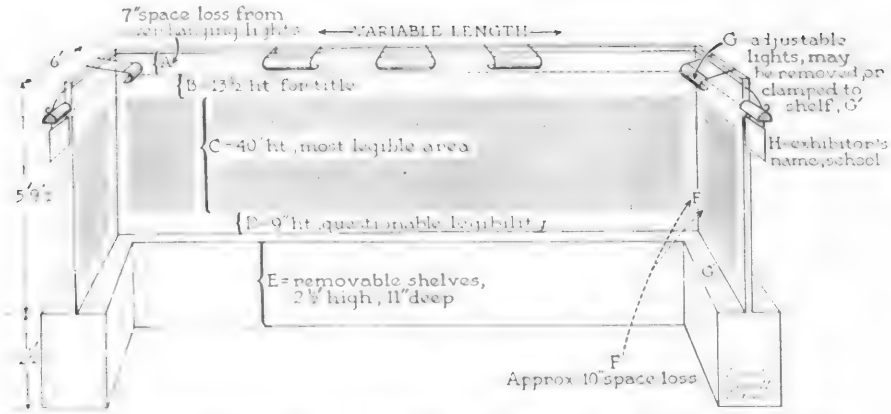

Figure 1. Diagram of an A.M.A. booth. Grey pattern indicates usable areas.

tion time and expense is the responsibility of the author and his institution.

(3) Lettering. Pleasing styles of lettering easily read at a distance of four to six feet should be used. Textbook type is meant to be read fifteen to eighteen inches away. Whenever one has to come that close to read the legends, a serious error in display technique has been made. Incidentally, that mistake is made far too often. A display is *not* a textbook.

(4) Design. Good design means the arrangement of all the component parts — lettering, pictures, models, specimens, color areas, etc., into an artistic whole. Not only must the relationship of these items be considered for each poster, but each poster in turn must be artistically related to its neighbor to produce the integrated result designated as "an attractive exhibit."

(5) Illustration Material. Drawings, photographs, transparencies, graphs, and models like lettering — should be easily seen four to six feet away. How often one sees monotonous rows of small illustrations when a few well-chosen enlargements would have conveyed the same amount of knowledge more emphatically. Not only should they be large and contribute worth-while information; they should be composed to eliminate distracting extraneous objects. The picture should be either self-explanatory or accompanied by a brief legend. Statistical data is more interesting when made into colorful, bold, simple graphs, charts, or maps. When transparencies are being considered, their cost, the display case cost, and the shipping charges should also be considered. Transparencies meriting awards are often ineffectively mounted — jammed one next to the other so that a confusion of color offends the eye. They should be separated from each other with wide margins.

(6) Color. Serves many purposes in an exhibit: It unifies the text by guiding the eye from point to point. It gives emphasis and dramatic effects where they are needed. It attracts attention and thus aids in bringing the visitor into the booth. It stimulates emotional reactions and establishes a mood.

(7) Objects. Moving gadgets, specimens, models, or live demonstrations never fail to intrigue an audience. However, if their primary function of contributing information is negligible, one should resist the temptation to use them merely "to put on a good show."

What Is the Author's Aim? Before one can begin to mold the aforementioned ingredients into a unified whole, one must first understand what the author is striving to say and teach. Is he discussing new surgical techniques, laboratory procedures, or research statistics? When one possesses an intelligent comprehension of the author's aim and knows what problems will be peculiar to his particular exhibit, then one can begin to plan, combining all the elements with judgment and good taste.

What Problems May Arise? The usual problems are: amount of material to be shown, size of booth, cost, and time limit. Wall space will tolerate only a certain amount of text and illustrations (Figure 1). If the author wants

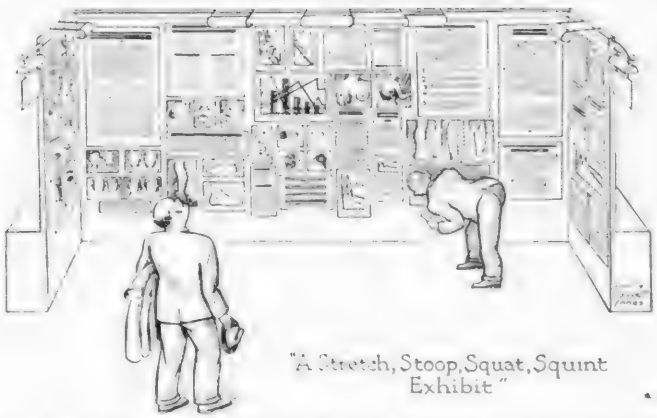

Figure 2. A typical disorganized display that foot weary visitors avoid.

innumerable photographs and miles of explanatory text and the booth dimensions will accommodate only half that amount, then judicious and tactful editing is in order. The exhibit cost cannot exceed available funds[1]. Even though the budget may be limited, however, the resulting exhibit should ably compete with its more costly neighbors. Accomplishing this is the test of a good designer. In an estimate of cost these items are included: all conferences, sketches, the scale layout of the booth, finished drawings, diagrams, charts, photographs and their mountings, labeling, retouching, trimming (or tinting), lettering of text, titles, labels, credit signs, transparencies, construction of special cases, models, miscellaneous incidentals, and the overtime pay for outside help needed for "rush jobs." As for the time problem, it is understandable that an elaborate six-month job cannot be done in three weeks or less. But one should still be able to present the author's material artistically with clarity, unity, brevity, and accuracy.

It is not enough for a photographer to be master of the mechanics of his equipment nor for an artist to be master of various media. Their professional responsibility to the author exceeds mere craftsmanship. They must know how to teach via the use of visual aids. Briefly summarized, this means: attract the visitor's attention, hold his interest, get the message across to him.

Just as a working knowledge of photography enlarges the artist's field of understanding, so will the photographer benefit from a few art courses such as: advertising layout, design and composition, color and lettering. Advertising layout will teach one how to adjust text to illustrations harmoniously. Design will teach one how to unite exhibit ingredients to attain the desired visual and emotional reactions required by the subject matter. A color course will give one a greater appreciation for color combinations and how they can be used. A lettering course will acquaint one with various styles and teach one how to evaluate the styles for poster usage and how to tell a lettering artist or printer what effect is desired.

When the exhibit is finished, one's task is still incomplete, for the posters must be packed to withstand the rigors of freight handling and *they must be hung as planned*. Therefore, give the author detailed instructions for crating and packing and give him the original scale layout to guide him.

If you wish the author's good will and blessings, remind him to be prepared for emergencies, for convention booths vary in construction and are not always what one was led to expect. Unless prepared, the author may find himself 2,000 miles from home, on a Sunday morning when most stores are closed, wanting one or several of the following items: hammer, drill and bit, screw driver, screws, nails or tacks, scissors, measuring tape or rule, twine, adhesive tape, scotch tape, electrical extension cords, plugs, and an art gum eraser for the last minute thumb print.

REFERENCE

1. Jones, T. and Hull, T. G. "Scientific Exhibits" J.A.M.A., Vol. 151, pp. 1482-1485, April 25, 1953.

The Basis for Certification*

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THE certification of vocational proficiency probably is as old as human endeavor. The aboriginal savage adorns his headdress and necklace with the teeth and claws of his kills to demonstrate his prowess as a hunter. One can easily imagine primitive Homo sapiens wearing around his neck, on a thong of sinew, the knuckle bones of his adversaries. Occupational ability was obvious in a primitive society; certainly the Neanderthal man with three wives in his cave required no American Board to issue him a rawhide certificate of strength and bravery. The need for formal and official recognition of vocational competency arose with the division of labor in the industrial development of town life, appearing during the XIII Century, and expressed by the formation of guilds. Each guild represented a specific vocation and governed the training and certification of its members by recognizing three distinct classes: the Apprentice, who learned under a skilled craftsman; the Journeyman, who first put his training to practice for day's wages; and finally the Master Workman, deemed completely competent in his field. This pattern of classification developed by the guilds has come down to the present day and is easily recognized in the requirements for certification by the American boards for medical specialties.

In the structure of modern society there are a number of means by which vocational proficiency can be recognized. These include: (a) completion of apprenticeship, utilized by many artisans' unions today; (b) certificates or diplomas, issued by special vocational training schools; (c) college training, officially recognized by the collegiate degree; (d) legal licensure, as in medicine and other vocations in which the life and welfare of the populus is concerned; (e) society membership, as a recognition of acceptance by one's peers; and (f) organized certification. For a number of reasons which we shall not pause to consider at this time, organized certification is evolving as the means of choice for the recognition of training and proficiency in vocational fields associated with the biological sciences.

The entire question of certification, its advantages, structure and the mode for its adoption, is now before the Biological Photographic Association, and it admittedly has engendered controversy. Many of my remarks will be based on a familiarity with the features of certification developed in the field of medicine, and are from the viewpoint of a pathologist. There is great similarity between biological photography and medicine; both require a scientific training in biological and other scientific fields, and artistic application in their practice. Consequently, I think it is not unreasonable that we approach this question with the foreknowledge of the structure of certification in the medical specialties. In applying the features of certification in medicine to the field of biological photography, one must remember that in medicine for forty years, since 1912, there has been progressive standardization of basic collegiate training by the American Medical Association and state licensure. Some of the specialties, as surgery and ophthalmology, have been recognized for many generations, and even the newer specialties cover fields which are, in the main, easily delimitable. The central representative organization of the American Medical Association, over 100 years old, afforded a basic authority to promote the development of certification; and every specialty in medicine has at least one if not several representative national societies which can give authoritarian and recognized sponsorship. Perhaps it is fair to add, too, that with the risk of life involved, the public has been motivated to spur and accept the adoption of the principle of certification of medical specialists. Although biological photography is as old as the quarter century that your Society has existed, large numbers of practitioners of your profession have appeared in just the last few years and educational policies in your field are only now crystallizing in an acceptable fashion. We must examine the objectives for certification and the means that you might choose to inaugurate such a program. The adoption of certification requires major policy decisions. My remarks will be tempered by the recommendation that, as a Society, you

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proceed carefully, adopting a course which will be supported by the majority opinion of your Society and, at the same time, reach for the stars.

The basic purposes of certification are twofold, to insure and protect the public of the competency of those who specialize in biological photography, and to give recognition to the qualified practitioner. Its adoption should enhance the pursuit of several major objectives:

1. To encourage the study of biological photography.
2. To define the standards of training in biological photography and to progressively elevate them.
3. To promote and improve the practice of biological photography.

Several steps necessary to achieve these objectives follow in logical sequence:

1. Definition of the field of biological photography.
2. Determination of the minimum standards of training, experience, and competency.
3. The devising of means and methods for evaluating and measuring the achievements of individuals in this field.
4. The determination of the competency of those wishing certification in biological photography by the judgment of individual qualifications and by appropriate examinations, written, oral, and practical.
5. The granting of certificates of proficiency of training and preliminary practice.
6. The maintenance of a registry of the recipients of certificates and the publication of such lists to the interested public, together with the publication of the standards of training and practice.

The definition of the field of biological photography must be made as complete and pertinent as possible, remembering that the term biology embraces many significant and important subdivisions of both academic and practical importance. The standards of training and practice must be such as to be desirable and acceptable to the present practitioners of your profession and at the same time they should urge new candidates to ever higher levels of achievement. Each subdivision of your specialty must have sufficient uniformity in its requirements and practice that all aspirants to certification can be treated with judicial fairness. Unless a considerable number can conform to a uniform set of standards, one should question the practicability of certification.

The benefits of certification accrue progressively with the passage of years. It can continue to increase in value and importance until, in a decade perhaps, it becomes the authoritarian standard of vocational recognition. Such success of certification requires that its standards are originally set on a realistic basis, that it be supported by majority of those who, by a common-sense judgment, are representative practitioners of your profession, and that the program is administered with complete intellectual integrity.

In contemplating the value of certification, we must also keep in mind its inherent limitations. Certification concerns and controls only the training and early experience of the individual candidate and does not in itself assure the ethical acceptability of continued practice by one who has an originally adequate training. For this reason certification should be revocable for cause at any time in the future, and such right should be clearly understood when the certificate is issued. Also, a certificate should not be confused with an academic degree or diploma from an educational institution. The certifying board is not a faculty; it merely surveys, moderates, and controls the training policies in the specialty.

In the organization of a certifying board a number of items must be considered. The board should have the sponsorship of a recognized national society. Should there be several societies which are national and representative of a specialty, all should cooperate and participate in the support and sponsorship given the certifying board. This participation need not be of equal weight. Furthermore, sponsorship and the moderating, impartial influence of an outside observer can be obtained from societies of specialists associated with but independent of the field in question. The name of the board should be one that is meaningful and individual so that it can be copyrighted. In your case one might suggest, for example, the "National Board of Biological Photographers."

In the organizational structure of a certifying board it is important that its independence

be assured. One can visualize a certifying board as a special and rather independent committee of a society, but such an organizational integration hardly gives the board the independence and autonomous nature that it requires. A board should be dependent upon societies for sponsorship but be self-sufficient in function. The medical specialty boards are independently incorporated. Such independence gives as its great advantage a freedom from extrinsic pressure both concerning individual candidates and the maintenance of standards. Perhaps it has the disadvantage that the board can become arbitrary and reactionary in thinking, failing to keep up with the changing concepts of practice, but this situation should be remedied in time by the new members elected to the board by the sponsoring society or societies.

Members elected to the board should be acceptable to their predecessors. They should be elected for a term that is sufficiently long to insure that they will learn their duties and have an opportunity to execute them over a period of years; such a term might arbitrarily be stated as six years. The terms of members of the board should be staggered so that the board will never be depleted of experienced members. In number, the board could include from seven to perhaps as many as eleven members. The board organizes itself internally by election of its own President, Vice-President, and Secretary-Treasurer. The board should have the right to collect fees to finance its operation. Although board membership usually is a labor of love without individual financial compensation, the holding of examinations entails considerable expense.

The requirements for certification of an individual in biological photography can be worked out in a preliminary way by a committee or committees of this Association. This will insure that the standards selected are realistic and acceptable to the membership at large. After its organization, the board should have control of the standards it maintains, giving due audience to the suggestions from the sponsors. The requirements for certification can be divided into two groups, those which are general, and those which are specific to the training in your particular profession. The general requirements should include these four features:

1. Acceptable, satisfactory moral character.
2. Acceptable ethical standing, as judged by the unwritten or written code of ethics of your society.
3. Membership or associate membership in a recognized specialty society.
4. The requirement that the applicant devote his vocational time, primarily and principally, to the practice of biological photography.

The requirement of membership in a specialty society is perhaps debatable. It has the particular advantage that the individual member must continue to abide by the ethical standards of the society. Expulsion from society membership is the greatest penalty that can be applied to control the violation of ethical principles. I feel that the last stated requirement, that the applicant devote his full time (nominally speaking) to the practice of this specialty, is imperative. The full significance of certification will be lost if it is awarded to those who do not follow this line of endeavor as their principal life work.

It is perhaps more difficult to determine the specific requirements which concern so intimately the special training needed for biological photography. Obviously, they must be determined by prolonged deliberation by biological photographers. My following discussion of such specific requirements is meant only to be illustrative of principles; I would not presume to be taken literally or in detail.

The basic educational requirements should include the holding of a high school diploma. The requirement of college training must have your most serious deliberation. It would appear that college training in this specialty would be most desirable but, at the present time, I believe it must be considered as an acceptable alternate to apprenticeship training.

The training in biological photography should extend over a definite period, of four years for example. Of these, perhaps three years could be satisfied by the equivalent of college credits including appropriate scientific courses. At least one of the required four years of special training should be devoted to actual practice in the specialty, as a journeyman.

Whether a candidate has had formal collegiate or other training in course or has acquired his training by apprenticeship should be no impediment to a definition of the subjects in which the candidate should be trained. His scope of training should include all of those subdivisions which would be considered

as necessary to a full training in basic photography. This will be influenced by the examinations given by the Board. They probably will cover such subjects as the physics of light, the chemistry of photography, the physiology of vision, elementary art, light and shade, composition, layout and design, optical systems, camera instrumentation and projection mechanisms, printing and reproduction, dark room technique, and applied camera technique. In addition, his training should include those subjects which are necessary as fundamentals in biological photography, such as microphotography, visual educational aids, projection, and training in some subdivision of biology such as botany, zoology, anatomy, or medicine. This special training should include nomenclature, form and function, and, where it is concerned, clinical application.

The examination of candidates for certification requires three different functional activities by the board. The basic requirements of the candidate must be evaluated, his training must be tested by appropriate examination which can be either written or oral and preferably should include some form of practical examination. Evidence of the candidate's practical work should be available. The board should require that such practical work be given credit only when it is under a qualified or certified biological photographer.

When inaugurating a system of certification, consideration must be given to those now working in the field who have demonstrated by their life-long activities their proficiency in this vocation. Some form of "grandfather clause" must protect and provide for these individuals. In this regard it is well to appreciate that often the most artistic and proficient members of your profession, achieving their high position by individualistic initiative, tend to be refractory against certification and justifiably resent examination by other practitioners in the field. For these and similar reasons, alternate requirements for certification should apply to those who are now working as biological photographers. Some such system of seniority consideration as the following could be adopted:

1. For those who have worked full time in biological photography for a period of five years—the right to admission to examination without review of their training.
2. For those who have worked full time in biological photography for a period of ten years—admission to certification without examination, on the cognizance of their vocational position.

In both of the above alternate groups, each candidate should be expected to satisfy the general requirements for certification.

In our deliberations it is important to remember that certification is essentially voluntary, self-imposed by its membership and by each candidate that aspires for this type of recognition. It should not be confused with legal control of the right to practice in a special vocational field and it should not deny anyone the freedom of selection of occupational activity without society recognition.

I personally feel that certification would enhance the professional standing of biological photographers and that a system of certification is workable in your specialty. Whether it is necessary is another question. To espouse certification you must carefully and honestly examine the standards for training and practice that you can set up, and you should expect your membership to live up to the standards that you adopt. It is also important to inquire if adequate training facilities are available to those who wish to become candidates. I have complete confidence that your committees can, with continued deliberation, give the proper solution to these problems. I am sure that all participating in this work will be rewarded by the knowledge that their efforts will further increase the stature of a profession which has, without certification, won to such high levels of merit and achievement.

BOOK REVIEWS

THE FUNDAMENTALS OF RADIOGRAPHY, 8th Edition, Medical Division, Eastman Kodak Company, Rochester 4, N.Y., 100 pages, illustrated (1953), paper bound, free, 5¾ in. x 8½ in.

The Fundamentals of Radiography was first published in February, 1938. The present edition brings its contents completely up to date, especially with respect to Kodak radiographic materials. The book provides basic data on the theory and practice of radiography for student doctors and technicians. It is intended for students, thus the discussion has been kept simple and brief.

The book is divided into three major sections: Principles of Exposure; Principles of Processing; and, Supplementary Topics. It is generally illustrated with photographs, charts, drawings, and reproductions of raidographs.

THE INTELLIGENT USE OF THE MICROSCOPE, First American Edition, C. W. Oliver, The Chemical Publishing Co., Inc., 212 Fifth Ave., New York 10, N.Y., 192 pages, illustrated (1953), 5¾ in. x 8¾ in., cloth bound, $4.00.

The first American edition of this instructive text is the *second* edition of the originally British published book. The justification for the new edition rests solely upon the author's desire to include data on phase microscopy, which he considers a major development in expanding the performance of the optical microscope.

The value of Mr. Oliver's basic working manual on the use of the microscope, however, will not be found in his brief chapter on phase contrast microscopy. Its real merit is contained in the lucid chapters on the optical theory of the microscope, components of the microscope and accessories, selecting proper equipment, illumination, and the microscope in use. To one who is not an expert in the field, Mr. Oliver will appear as a peer among those teachers blessed with the rare faculty of presenting complex subjects in a thoroughly comprehensible way.

INSECTS CLOSE UP, Edward S. Ross, University of California Press, Berkeley and Los Angeles, 81 pages, approx. 6 in. x 9 in., illustrated, paper bound, $1.50 (1953). Available from publisher or Exakta Publications, 705 Bronx River Road, Bronxville, N.Y.

A pictorial guide for the photographer and collector, containing 125 photographic examples and drawings, including several color plates. The author is Curator of Entomology at the California Academy of Sciences, who has combined his knowledge of insects and photography to produce a very readable and instructive manual. The illustrations are first-rate examples of biological photography. Mr. Ross leaves very little to the imagination. The expert may consider his attention to detail somewhat too unassuming, but the lesser experienced worker will appreciate the author's recognition that few entomologists are photographers, and vice versa. A useful list of references and suppliers concludes the text.

EXPOSURE METERS — AND PRACTICAL EXPOSURE CONTROL, J. F. Dunn, Fountain Press (available from Rayelle Foreign Trade Service, 5700 Oxford St., Philadelphia 31, Pa.), 260 pages, illustrated (1952), 6¾ in. x 8¾ in., British price 35 shillings, American price not given.

For many years there has been a need for a thorough book on the use of photoelectric light measuring instruments for exposure determination. Mr. Dunn has made a fairly successful effort in this direction but it cannot be said that he has presented a treatise that will be to everyone's liking. He discusses the general theory of exposure and illustrates his points quite will. His philosophy expressed in the first part of the book will probably prove more meaningful to most readers than everything else contained in the text. His very lengthy discussion on exposure tables and calculators is almost worthless to American readers because prepared calculators for nearly all conditions are already freely available in this country. Also, his chapter on extinction meters and the S.E.I.

exposure photometer will be of little value to American readers. Nevertheless, the author's treatment of photoelectric meters of all types for both still and motion picture photography is well presented and of considerable practical value. A bibliography of 58 references is given.

THREE DIMENSIONAL TEACHING AIDS, Anonymous, Superintendent of Documents, U. S. Government Printing Office, Catalogue No. FS 5.4:366, 91 pages, illustrated, 1953, $0.45.

This is a circular on three-dimensional teaching aids which has been prepared for the following purposes: 1.) To illustrate the many ways in which visual instructional aids of this type may be used: 2.) To promote the idea of such use in trade and industrial teaching: 3.) To stimulate interest on the part of teachers in creating comparable aids for their own use in teaching. One could use the illustrations in the circular to emphasize the value of three-dimensional aids as a means to more effective instruction and to show how teachers themselves may devise and obtain these aids at relatively low cost.

CAMERA LENSES, Arthur Lockett, revised by H. W. Lee, 3rd Edition, Pitman Publishing Corp., 2 West 45th St., New York, N.Y., 142 pages, illustrated (1952), 5 in. x 7½ in., $2.50.

A quotation is given in the Preface to this 3rd Edition, which was taken from the Preface of the 1st Edition, that states the need for the book. "A first-rate lens needs to be handled in a proper and workmanlike manner. This cannot be done without understanding." In view of the important developments in camera design that have taken place in recent years and the growing popularity of the miniature camera, these words are probably more to the point now than they were in 1925, the date of the 1st Edition. The book has been almost entirely rewritten but many of the illustrations are the same as those which appeared previously. However, the principles of optics do not change and so there would have been no justification for making new illustrations.

There are eight chapters in the book, the titles of which indicate the subjects covered in the book. I. Properties of A Simple Lens; II. Aberrations of A Simple Lens; III. The Focal Length of A Lens; IV. The Diaphragm or Stop; V. Lenses for Photography; VI. The Telephoto Lens; VII. Supplementary Lenses and Magnifiers; VIII. Lens Mounts; IX. The Lens and the Shutter; X. View-Finders; XI. Range-Finders; XII. The Care of Lenses; and XIII. Testing Lenses.

CINE FILM PROJECTION, 3rd Edition, C. A. Hill, Fountain Press (available from Rayelle Foreign Trade Service, 5700 Oxford St., Philadelphia 31, Pa.), 192 pages, illustrated (1952), 5 in. x 7½ in., British price 15 shillings, American price not given.

Mr. Hill, in his third edition of his book, has brought the contents up to date and has included considerable new material over previous editions. However, the basic data on the principles of film projection have remained practically unchanged. The treatment is very clear and to the point and forms an excellent elementary handbook for the novice in motion picture photography. The equipment discussed is mostly of non-American origin. An appendix is included which gives a useful list of motion picture periodicals, year books, societies, and a glossary of terms peculiar to the motion picture field.

CAMERAS FROM GERMANY, Anonymous, Hanns Bierl Publishers, Maximilianstrasse 21, Munich, Germany, 157 pages, illustrated (1950), 6⅞ in. x 8 in., no price given.

This book, although printed in Germany, is published in English, primarily to acquaint American readers with camera equipment manufactured in Germany. As a matter of fact, it is dedicated to "all American camera fans." It includes a listing, with complete specifications of all cameras produced in Western Germany through 1950.

GLOSSARY OF COLOR TERMS USED IN SCIENCE AND INDUSTRY — British Standard 1611:1953, British Standards Institution, 24 Victoria St., London, S.W. 1, England, 18 pages, 1953, 3 shillings 6 pence.

As a previous reviewer has stated in connection with the *Glossary of Colour Terms*, "the perception of colour is an everyday experience so familiar to us that we seldom pause to consider the exact meanings of the terms we use to describe it." This reviewer was a Britisher, but what he states is just as true in the U.S.A. as it is abroad. The B.S.I.

publication goes a long way in defining terms used in various color fields to avoid the popular, ambiguous definitions that are so frequently given. The book presents a more or less internationally agreed nomenclature, and it is pleasant to see that it includes the word "luminance" instead of the term "photographic brightness."

35MM PHOTOGRAPHY, Jacob Deschin, Camera Craft Publishing Co., 95 Minna St., San Francisco, Calif., 192 pages, illustrated (1953), 6¾ in. x 9¾ in., $5.00.

Mr. Jacob Deschin, Camera Editor of the New York Sunday Times, has been an enthusiastic exponent of 35mm photography for many years. This is the first book that he has written on the subject. In it he presents his views as to the best approaches and techniques for successful photography with 35mm equipment. The book contains six main sections entitled, The Approach, The Camera, The Lens, The Method, The Technique, and The Process. Each of these main sections contains two or more chapters which develop the subject in detail.

Mr. Deschin has a very fresh approach to miniature camera photography. His writing is imaginative and inspiring and not filled with the usual "filler" material that is so often found in monographs on the subject. For illustrative purposes the author has called upon 54 leading users of 35mm equipment. Their pictures, in addition to the author's, make the book something more than the usual treatment on camera technique. The publishers have done an excellent job in typography and in reproduction of the halftones.

THE TECHNIQUE OF FILM EDITING: BASIC PRINCIPLES FOR TV, Karel Reisz, Farrar, Straus and Young, 101 Fifth Ave., New York 3, N.Y., 276 pages, illustrated (1953), 5¾ in. x 8¾ in., $7.50.

This book was prepared by Mr. Reisz for the British Film Academy. It is extremely thorough and can be fully understood by the non-specialist in film editing. The first part of the book is devoted to a history of editing, showing why a need for editing arose and in what ways its development has been influenced by the transition from silent to sound films. The greater part of the book, however, concerns the principles of editing and how it has been used by various editors for a great variety of creative purposes. Throughout this part of the discussion the author assumes a practical approach and not a theoretical one.

The book contains sections on action cutting, dialogue, comedy, montage, reportage, teaching films, news reels, etc. Ten leading British film editors assisted the author in preparing the text.

The book contains an appendix on cutting room procedure, a bibliography and a glossary.

PHOTOGRAPHY AFIELD, Ormal I. Sprungman The Stackpole Co., Harrisburg, Pa., 449 pages, plus 7-page index, illustrated (1953), 7¼ in. x 10½ in., no price given.

This is a book that should appeal to biological photographers, especially those who are interested in wildlife and other outdoor biological subjects. The author discusses both still photography and motion picture photography. Although the beginning of the book emphasizes equipment and technique, the main body of the book deals with the photography of particular groups of biological subject material. Bird photography, big game animals, natural history subjects, fish, etc., are each presented in detail.

One could not consider this a very advanced text, but for the novice who wishes to learn certain tricks of the trade in outdoor biological photography, it will serve very well. The expert, on the other hand, will consider some of the author's discussions rather naive and unsophisticated.

THE THEORY OF STEREOSCOPIC TRANSMISSION AND ITS APPLICATION TO THE MOTION PICTURE, Raymond Spottiswoode and Nigel Spottiswoode, University of California Press, Berkeley and Los Angeles, Calif., 180 pages (1953) illustrated, 6¼ in. x 9¼ in., $6.00.

This is the first book at a technical level which deals exclusively with 3-D motion pictures. It is a fundamental treatment of the subject, and presents the transmission theory necessary for understanding the various systems of image separation, accounting for the modification in shape and position of an object as it is recorded photographically, printed, and viewed by observers. The au-

thors credit Prof. J. T. Rule of the Massachusetts Institute of Technology for the original inspiration of their study, but the research on which the book is based was undertaken for the British Film Institute and the Festival of Britain.

The mere mention of the name "Spottiswoode" should convey that the book is an authoritative one. The authors have published many papers in the field, and in 1952 presented a classical paper (with Charles W. Smith) entitled "Basic Principles of the 3-Dimensional Film" in the Journal of the Society of Motion Picture and Television Engineers (October, pages 269-286). However, it is not an easy book for the average photographer, even for those who pretend to be technically inclined. The mathematics does not go beyond simple calculus, but the practical photographer will consider the treatment highly mathematical. This is unfortunate, because it may result in a reduced reader interest. Actually, the authors should be congratulated for presenting the subject in an objective manner, without the usual chit-chat that goes along with most treatments on 3-D photography. Readers should be pleased, also, to get their money's worth in a relatively small book, and should take pleasure in knowing that the time required to comprehend each chapter can lead only to a knowledgeable understanding of the subject.

There are four main parts to the book, namely, "Image Transmission in Plano-stereoscopy": Characteristics of Practical Transmission Systems": "Mechanisms and Methods"; "The Human Factor in Stereoscopic Transmission". Each of these parts has several chapters which logically develop the main subject of consideration. There is no doubt but that this book will be referred to often in the future writings of those engaged in stereoscopic research. It is to be highly recommended as a text and as a standard reference.

UNIVERSAL PHOTO ALMANAC 1954, Edited by Ralph Samuels, Falk Publishing Company, Inc., 10 W. 33rd St., New York 1, N. Y., 264 pages, illustrated, 8½ in. x 11 in., spiral binding, $2.50.

This 18th volume of the Universal Photo Almanac is quite unlike any of the previous volumes in general make-up and size. It has a modern layout and its feature contents are slanted to a somewhat more sophisticated audience than in previous years. However, the "almanac" part of the annual, which occupies more than half of the pages, remains practically unchanged. Nevertheless, the general formulary and data section, the market guide, and bibliography have been brought up to date and are easy to read.

An article by Lewis W. Morgan, entitled "Macrophotography in One Easy Lesson" may prove of value to some biological photographers who have had limited experience in such work. It is an acceptable basic treatment, fairly well illustrated. An historical article by Cedric Larson, entitled "How Photomania Swept America 100 Years Ago" is well worth reading. The author lays great stress on the early inventive skills of Americans in fostering the rapid development of photography and cites the number of patents issued to Americans in various fields of photography during several periods. It is surprising that he overlooked the first photographic patent in this country, issued to Alexander Wolcott in 1840.

TECHNIQUES OF PHOTO-RECORDING FROM CATHODE-RAY TUBES, 3rd Edition, Anonymous, Allen B. Du Mont Laboratories, Inc., Clifton, N.J., 35 pages, illustrated (1953), 6 in. x 9 in., free.

As in previous editions, this booklet brings together in one source the principles and techniques involved in making photographic records of cathode-ray tube images. The new edition has a special section on the adaptation of the Polaroid-Land Camera for oscillograph recording. Du Mont cathode-ray tube equipment for photographic recording is fully described and brought up to date.

PHOTOGRAMS OF THE YEAR (1954), Iliffe and Sons Limited, Dorset House, Stamford Street, London, S.E. 1, England, 32 text pages and 96 photogravure illustrations, 7½ in. x 10 in., 1953. (Available in America from Variety Books, Box 97, Bronxville 8, N.Y., $3.00.)

Contains a selection of pictorial photographs from the more important salons of the year, with a critical commentary by R. H. Mason. The illustrations are reproduced by photogravure, and represent first-rate examples of graphic reproduction. The pictures themselves show little imagination and are typical of the salon exhibition work seen over and over for many years.

New Products

EXAKTA CAMERA IN NEW SIZE

Exakta Camera Company, 705 Bronx River Rd., Bronxville 8, N.Y., are presenting the new Exakta, called the "66", which takes 12 pictures, 2¼ in. x 2¼ in. in size, on 120 rollfilm, to the American market. The shape and design are radically different from the experimental model of the camera, introduced in 1939 but suspended immediately afterwards because of the war. The body is now roughly square in shape, measuring 5½ inches high, 4½ inches wide and 4½ inches deep (without lens). All important operating mechanisms are located on the right side. The standard lens supplied is an 80mm, f/2.8, Zeiss Tessar, with built-in preset diaphragm and sunshade.

The two-curtain cloth shutter and two speed setting knobs are similar to those of the 35mm Exakta models. The two knobs provide for

29 speed settings ranging from 1/1000 second to 12 seconds for instantaneous release. Delayed action exposures can be made up to a speed of 6 seconds. The new camera also has an automatic film-transport, shutter-cocking mechanism that operates from the first frame. An indicator on the camera back indicates when the first frame has been reached. The film-transport mechanism locks until the exposure has been made. The film then can be advanced only enough to bring the next frame into position. Double exposures are possible, but it is possible to prevent accidental exposures.

The lens has a bayonet mount and is interchangeable. Additional lenses will be available ranging in focal length from 56 to 400mm. Several wide-angles, f/3.5 Primotars of 85, 165 and 180mm and f/5.5 Meyer Tele-Megors of 150, 180, 250 and 200mm (sic) are among those lenses which will be provided for the new camera in the future.

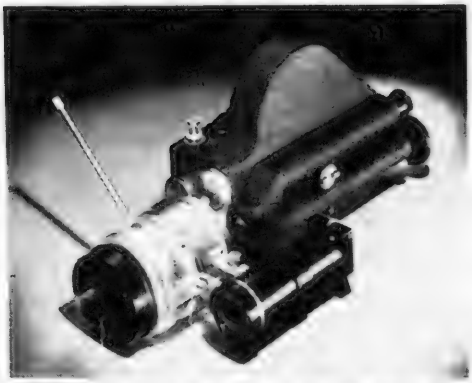
The back of the camera is removable and interchangeable backs will be made available. Built-in flash synchronization is provided by means of a single socket for both regular and electronic flash, and an adjustable scale permits the time delay to be altered within the 0-20 millisecond range.

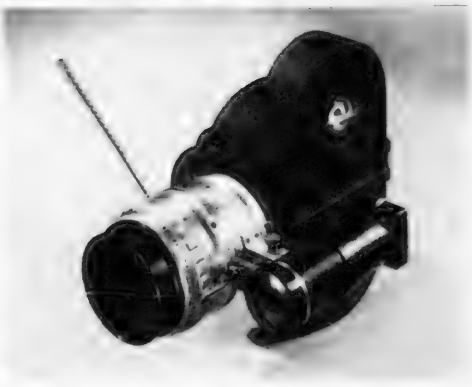
The folding viewfinder is removable for interchange with other viewfinders which will be available. The camera will come with the standard viewfinder which can be used at waist level or, if the front window is opened, as an eye-level, sports finder. An eye-level Penta Prism will be available later as an accessory. The standard viewfinder includes a hinged magnifier equipped with an eyepiece for focusing comfort. The magnifier covers the entire ground glass area. The ground glass is a condenser type element with a finely ground base for brighter illumination. Price, $300 with the standard 80mm lens.

ANSCO SINGLE-MIX VIVIDOL DEVELOPER

Ansco Vividol, universal developer for films and papers, is now being supplied as a single-mix preparation in foil-sealed packets. The contents of each packet are dissolved in 16 ounces of water to make up the stock solution.

Each packet is sufficient for developing six rolls of 120 film or 100 sheets of 2½ in. x 3½ in. paper. Price, 12 cents each or three for 35 cents.





PAN CINOR ZOOM LENS

Paillard Products, Inc., 100 Sixth Ave., New York 13, N.Y. advise that the Pan Cinor zoom lens is available for most professional 16mm cameras as well as for amateur 16mm motion picture cameras. The lens is made by SOM Berthiot. The illustrations above show typical installations on various cameras. In some instances the camera manufacturers have to make adaptations at nominal costs for fitting the lens to their particular models. The price of the Pan Cinor, not including any necessary adaptation costs, is $447.50. Full particulars can be obtained from Paillard Products, Inc.

POLAROID AND TECHNICOLOR ANNOUNCE VECTOGRAPH, NEW 3-D FILM PROCESS

Three dimensional color motion pictures on a single strip of film requiring only one projector with no attachments whatever may soon be expected. This will be brought about by the combination of the Technicolor dye transfer printing process and the new Vectograph base film of the Polaroid Corporation. Dr. Herbert T. Kalmus, President and General Manager of Technicolor, and Dr. Edwin H. Land, President of Polaroid, have announced that agreements were entered into between their two companies which they expect will make this possible. In these agreements, Technicolor is licensed under Polaroid patents to make full color stereoscopic motion picture prints on Vectograph material.

Technicolor will employ these Polaroid inventions in an attempt to make new stereoscopic color motion picture prints available to the theatres as soon as possible. If this new application of the Polaroid invention by Technicolor proves successful, executives of both companies believe that the Vectograph should provide a fresh impetus to the production of 3-D pictures by making them more comfortable to view and by making it easy for exhibitors to show them.

Up to now, three dimensional pictures have not only been photographed on two strips of film but have been projected from two strips of film. With Vectograph release prints, all exhibitors will be able to show 3-D pictures without making any change in their 2-D booth equipment. A projectionist need not know that he is running a 3-D picture.

In taking the pictures, two cameras will be used at present, but the picture will reach the exhibitor as a single film. Patrons will wear polarizing glasses, improved models of which have already been introduced. Aside from the continued use of aluminized screens, the exhibitor will be freed from such special equipment requirements as interlocks, polarizing projection filters, and oversize magazines. Since both of the images required for 3-D are superimposed over each other on the same film base, the exhibitor is assured of perfect synchronization, alignment and focus of the two images on the screen for comfortable viewing. He will be able to run continuous 3-D shows without intermission.

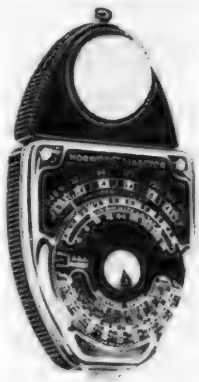
Unlike other single film proposals in color, the Vectograph film uses the entire film area, instead of only one half of each frame, for each of the two images required for 3-D. Instead of half-sized images placed side by side, full-sized images are superimposed one over the other. Pictures are expected to be correspondingly brighter and sharper in definition. Since the Vectograph images are processed with polarizing dyes, they require no polarizing filters at the projection port, so that the pictures will be noticeably brighter on the screen opening up the possibility of wide screen 3-D. Added optical efficiency becomes possible because the Vectograph is the first film to provide images in terms of degree of polarization instead of degree of density.

NEW PENTACON-WESTANAR LENS

The Pentacon Corporation, now located at 705 Bronx River Road, Bronxville 8, N.Y., now have available what is stated to be the first fully automatic preset diaphragm lens for a 35mm single-lens reflex camera. The lens is a 50mm Schneider f/2.8, called the Westanar. It

is manufactured especially for the Pentacon camera which was illustrated and described in JBPA, Vol. 21, No. 1, page 36. Price of lens alone is $89.50, plus $10 installation charge. The Pentacon camera fitted with the new lens is $249.50. Full operational details are available from the distributors.

NEW MODEL NORWOOD DIRECTOR EXPOSURE METER



An improved model Norwood Director Exposure Meter, with so-called "Color-Matic" Control for simplified direct reading when taking color pictures, has been announced by Director Products Corporation, 570 Fifth Ave., New York 36, N.Y. The "Color-Matic" Control is a perforated metal tab which slips into a slot in the meter proper. After it is slipped into place, one's camera is set for 1/50 seconds. The photosphere is then pointed at the camera position, and the meter indicates the proper "f" stop for exposure. In addition to the "Color-Matic" control, the new model features a redesigned dial face, with larger, more easily read figures than in the previous model. Price, $32.95.

EXAKTA WANTS PICTURES

Mr. George Berkowitz, Editor of Exakta magazine, 705 Bronx River Road, Bronxville 8, N.Y. has told us about the forthcoming Exakta Annual to be published for the first time in 1954. The annual will contain articles on various subjects and a collection of color and black-and-white illustrations taken with any type of Exakta camera. All kinds of material are desired, provided they represent the finest attainable. Payments will be made depending upon the amount of material accepted for publication. Articles, photographs or inquiries should be sent directly to Mr. Berkowitz, with return postage.

NEW BERTRAM PRESS-TYPE CAMERA

Willoughbys, 110 W. 32nd Street, New York 1, N.Y., announce that the new Bertram 2¼ in. x 3¼ in. Press-type Camera is now available in photo stores throughout the country. It is stated that the new camera has many features that

give it considerable versatility. The design incorporates, for the first time in a press-type camera, according to the announcement, more lens selectivity and more focusing ease, in addition to a precision usually associated with the finest 35mm camera.

Built to accept all 2¼ in. x 3¼ in. Graphic accessories, the Bertram adds the convenience of a new type of removable back which is easily changed for roll film. A built-in mask is fitted to the viewfinder, which gives correct field of view for all lenses when using the Graphic 2¼ in. x 2¼ in. roll film adapter.

The back of the camera, which is full tilting, has a positive locking device that makes it impossible for the tilt to be effective unless it

is absolutely desired. Knobs controlling the tilt are recessed and can be moved only by inserting a finger-nail under the hinge-grip to bring them above the surface of the camera body.

Four lenses are available, each with a click-stop diaphragm that can be operated by touch alone: an f/5.5 180mm telephoto, an f/6.8 65mm and an f/3.5 75mm wide angle lens, besides the normal f/3.5 105mm lens. The unique auto-selector construction of the lenses enables them to select the correct range-finder, viewfinder and distance scale in addition to adjusting for parallax by simply inserting the lens in its mount. Setting the dial at the top of the lens board selects the correct infinity stop. Thus, the Bertram camera, it is claimed, is four cameras in one. One which views the scene as the eye does, one which sees it as a telescope would, and two with the ability to take a broad-field, panoramic photograph. The changeover takes but a second. The lenses are made by the Schneider Optical Works, and each fits into the nine-speed Synchro-Compur shutter, which goes from one second to 1/400 second, plus time, bulb, and self-timer. Price, $495.00, with the 105mm Schneider f/3.5 lens.

CLINICAL CAMERA FOR COLOR PHOTOGRAPHS

A new 35mm clinical camera has been announced by Knebel Electro-Optical Instruments, 317 Rhinecliff Dr., Rochester 18, N.Y. The camera is equipped with its own light source, a multiple flash tube encircling the lens, provid-

ing shadowless light for objects ranging in width from 2½ inches to 24 inches. The flash tube is said to be satisfactory for 10,000 pictures before replacement. Positioning of the camera for near objects is simplified by two beams of light which cross at the proper focusing distance. Price and other details are available from the manufacturer.

INEXPENSIVE TWIN-LENS REFLEX CAMERA

Biber Foto Corporation, 153 West 23rd St., New York 11, N.Y., report that their new inexpensive twin-lens reflex camera, the Crown Flexaret, is meeting with considerable success. The camera is a 2¼ in. x 2¼ in. type, featuring an automatic crank-lever transport. It has an f/3.5 Mirar lens. Price, $99.88.

KINK-PROOF COILED CABLE

A self-adjusting camera synchronization cord is available from the Speedlight Center, 128 West 32nd Street, New York, N.Y. The cable extends from 9 inches to 3½ inches with virtually no pull, and returns to its original position by itself. The connector ends are rubber molded directly onto the cord. Price, $7.95.

ANSCO WANTS PICTURES

Ansco, Binghamton, N.Y., is interested in buying black-and-white photographs and color transparencies for use in its advertising. The prices paid for possession and exclusive advertising rights to negatives or transparencies vary, depending on their value to Ansco and the use to which they are put in the company's advertising programs. Model releases must be available for all identifiable people. Since the pictures are intended for reproduction, images should be as large as possible in the picture area. Negative size for black-and-white should be 2¼ in. x 2¼ in. or larger; color transparencies should be no smaller than 2¼ in. x 2¼ in. All pictures must be made on Ansco Film. Although most pictures purchased have human interest appeal, pictures of scientific subjects are sometimes required.

UNIVERSAL EXPOSURE METER FOR PHOTOMICROGRAPHY

The correct determination of exposure time is of great importance in photomicrography. For this reason, Gamma Instrument Company, Inc., 378-380 Great Neck Rd., Great Neck, N.Y., have developed a special unit, available under the trade name "MICROPHOT", for easing the problem. It is suitable for use with 35mm and bellow cameras accommodating negative sizes as large as 5 in. x 7 in. This is achieved by reducing or increasing the size of the photocell as required.

The "MICROPHOT" has a self-generating type photocell and requires neither batteries nor line connections. At maximum sensitivity one scale division corresponds to .004 foot candles. For measuring low intensities, the entire surface of the cell is used. Since the shape of the latter is rectangular, measurements can be taken on any part of the focusing screen, even in the extreme corners. With the

aid of adapters the photocell may also be placed on top of the microscope or attached to side viewing eyepieces of different attachment cameras. Space for filters is provided in the case. Price, $100.00.

NEW ADAPTER FOR THE RECTAFLEX

A new Rectaflex accessory has been announced by Director Product Corporation, 570 Fifth Ave., New York, N.Y., called the Amic adapter. The adapter fits the Rectaflex to the ocular tube of any standard microscope. When the camera is mounted into position, the specimen on the microscope stage may be observed through the Rectaflex eye-piece. Focusing is carried out directly on the ground glass and the effects of interposed filters can be evaluated. If the microscope to be used is not standard, the adapter can be made to order to fit the dimensions of the specific microscope. Price, $28.00.

Your Association

A section of the Journal devoted to official announcements, chapter news, activities of members, and other such matters concerning the Association.

23rd ANNUAL MEETING

A very enjoyable and informative Annual Meeting was sponsored by the Southern California Chapter of BPA at the Hotel Statler, Los Angeles, California, August 31 to September 3, 1953. The program for this 4-day meeting appeared in Volume 21, No. 3 of the Journal. The General Chairman, William L. M. Martinsen, and his supporting staff deserve abundant applause for organizing and conducting one of our most successful annual meetings. The following committee chairmen worked with Mr. Martinsen.

Program: Lloyd Matlovsky; Salon: Thomas Masterson: *Commercial Exhibits:* Frank S. Wilbar: *Secretary & Projection:* Avis Gregersen: *Printing:* George F. Brauer: *House:* Edward N. Hamilton; and *Official Photographer:* Pierre Le Doux.

Salon Awards

Only two types of award were given, namely, Honor Award and Honorable Mention. The following Honor Awards were made for black and white prints:

Heart Pains: R. A. Kolvoord, M.D. Anderson Hospital, Houston, Texas.

Unseeing Eyes: Sam Dunton, New York Park, Bronx, New York.

Metastatic Carcinoma Heart: William E. Perry, V.A. Hospital, Dayton, Ohio.

Schizophrenia (Dementia Precox): William Perry, Brown General Hospital, Dayton, Ohio.

Honor Award for color prints was as follows:

Ovary Dermoid Cyst Containing Brain Tissue: Stanley D. Harris, Rockford Memorial Hospital, Rockford, Ill.

Honor Awards for color transparencies:

Photomicrograph: Jack Muldowney, City Hospital, Akron, Ohio.

Molds: Avis Gregersen, U.S.C. Medical School, Los Angeles, Calif.

Carcinoma Under Wood Light: Burton C. Staugaard, Zoology Dept., University of Rhode Island, Kingston, R.I.

Honorable Mentions for black and white prints were as follows:

Subconjunctival Haemorrhage, Anterior fossa fracture: Robert Ollernenshaw, Manchester, England.

First Steps: Zane H. Price, U.C.L.A. Research Section, Los Angeles, Calif.

Plastic Cast of Tatoo: Benjamin M. Bravence and Erica Carlan, V.A. Hospital, Topeka, Kansas.

Proximal Tuble of Rat Kidney, Montage X 9,250: Roger Moore, V.A. Hospital, Long Beach, Calif.

Parasol Ant: Sam Dunton, New York Park, Bronx, N.Y.

Gleum Metastatic Adenocarcinoma: Stanley D. Harris, Rockford Memorial Hospital, Rockford, Ill.

Honorable Mentions for color prints:

Human Embryo in Amnion 44 Days: Richard D. Gill, Carnegie Institution of Washington, Baltimore, Md.

Esophageal Varices: John M. Lore', Jr., St. Clare's Hospital, New York, N.Y.

Honorable Mentions for color transparencies:

Insects: Roman Vishniac, Ph.D., New York, N.Y.

Insects with Speedlight: Leland R. Brown, Department of Entomology, University of California, Los Angeles, Cailf.

Motion Picture Awards

Motion picture awards were made for non-commercial and commercially produced films. The awards given for non-commercial films were as follows:

Nature Group

First Award, The World at Your Feet, Canadian Consul General's Office, Ottawa,

Canada — shown by Mr. M. L. Constant, National Film Board, Ottawa, Canada.

Award of Special Recognition, World of Science, Mr. Robert E. Gottschalk, Los Angeles, Calif.

Clinical Report Films

First Award, Local Anesthesia in Dentistry, Edward N. Hamilton, Los Angeles, Calif.

Surgical Films (silent)

First Award, Hernia Repair, Dean Altman, V.A. Hospital, Portland, Oregon.

Surgical Films (sound)

First Award, Wide Field Laryngectomy, Henry Raphael, V.A. Hospital, San Francisco, Calif.

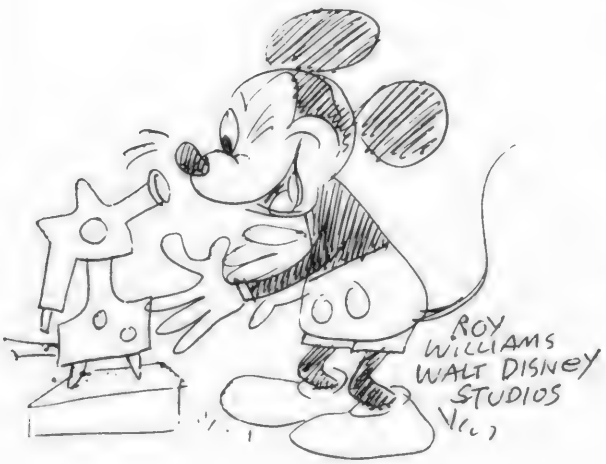
Awards for commercial films:

The first and only award was presented jointly to Warren Sturgis, Sturgis-Grant Productions, Inc., New York City, for the film Living Insurance, and to Churchill-Wexler Film Productions, Los Angeles, California for The Antibiotics and Terramycin.

Fellowship Awards

Fellowships were presented by Miss Anne Shiras to the following:

Percy W. Brooks, New York, N.Y.
Maria Ikenberg, Chicago, Ill.
Pierre Le Doux, Wood, Wis.
Chester Reather, Baltimore, Md.
Maurice Richter, M.D., New York, N.Y.
Warren Sturgis, New York, N.Y.
Verlin Yamamoto, Des Moines, Iowa



Roy Williams' 10-second interpretation of Mickey Mouse in the role of a biological photographer. Where's the camera?

Commercial Exhibitors

The following firms cooperated with the Association in making the 23rd Annual Meeting possible:

American Speedlight Corp.
Ansco
Atkinson Laboratories
Bausch & Lomb Optical Company
Berndt-Bach (Aurecon)
Lester Dine
E. I. du Pont de Nemours & Company
EMDE Products
Erb & Gray
Fenjohn Underwater Photo & Equipment Company
Oscar Fisher Company
Kling Photo Equipment Corp.
E. Leitz, Inc.
Mitchell Camera Corp.
J. G. Saltsman, Inc.
Silge & Kuhne
Varigraph

Annual Banquet

The social evening on Thursday, September 3, will long be remembered by all those present. The Eastman Kodak Company was the host for their traditional Cocktail Hour in the Los Angeles Room of the Hotel Statler prior to the banquet that was served in the Golden State Room. During the banquet Mr. Hal Adelquist, Director of the Story Department, Walt Disney Productions, acted as a most amusing and entertaining Master of Ceremonies. He was assisted by Donald Duck himself and Mr. Roy Williams, Head of the Animation Department of Walt Disney Studios. Mr. Williams' interpretation of a biological photographer, reproduced below, was sketched in less than ten seconds.

Elmer Belt, M.D., of Los Angeles was the guest speaker of the evening. He gave an excellently illustrated talk entitled Leonardo Da Vinci as a Medical Illustrator.

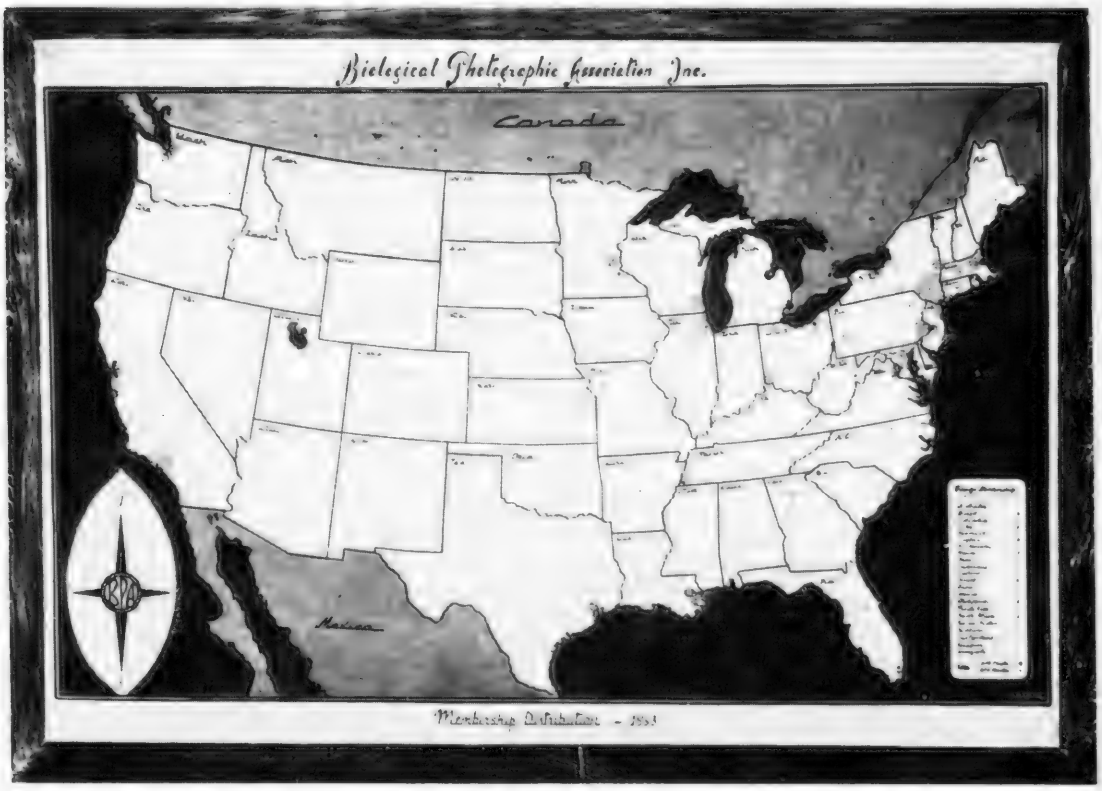
1953 Annual Award

Leonard A. Julin, past recipient of the BPA Annual Award, presented the first annual award under the new name Louis Schmidt Award to Dr. Oscar W. Richards. Making his presentation, Mr. Julin stated:

"A charter member of the Biological Photographic Association, Dr. Oscar W. Richards served on the Board for twenty years; as a Director from 1933 to 1947, as Vice-President 1947-1949, as President 1949-1951, and Ex-Officio to the present time. He has been a Fellow since 1946. During his service on the Board he proposed many actions, frequently volunteered to do various tasks which he completed with proficiency and dispatch. He arranged for Incorporation of the Association. Among his many activities he was Chairman of the Motion Picture Committee 1934-1949 and served as Editor of the Journal 1951-1952. He has written numerous papers on growth, microscopy and photography.

"In his work as a research supervisor for biology he has advanced photography through its application in research on mathematical analysis of growth of organisms, fluorescence microscopy of tubercle bacilli, phase- and stereo-photomicrography, microtomy and human vision. He has furthered standardization of photography and improvement in instrumentation through his service on various committees of the American Standards Association.

"For his outstanding contributions to the progress of biological and medical photography the Biological Photographic Association takes pleasure in presenting its 1953 Louis Schmidt Award to Oscar W. Richards, Ph.D., F.B.P.A., Research Supervisor for Biology, American Optical Company, Research Center, Southbridge, Massachusetts."



Map displayed at 23rd Annual Meeting showing geographical distribution of BPA members. Executed by Nicholas Bollotine, Medical Illustration Lab, Veterans Administration, Los Angeles, California.

CHAPTER NEWS

Warren Sturgis, Chairman, Chapters Committee

Boston: October 27, Mr. George R. Wiggin, of Eastern Aerial Surveys, Inc., demonstrated "Photographic Techniques Involved in Aerial Photography", and Mr. John E. Withee came down from Hanover, N.H. to give a resume of the BPA Annual Meeting held in Los Angeles.

Chicago: September 15, Mr. Edward Edstrom, from the Chicago Daily News staff, gave a paper on "Halftone Illustrations from the Printer's Point of View", and a report on the Annual Meeting was given by Secretary Maria Ikenberg. October 20, Mr. Ralph P. Creer, recently returned from a trip to Europe during which he attended and spoke on medical motion pictures at a number of scientific meetings, gave a report on clinical photographic activities abroad. He discussed in particular his experiences in London and Edinburgh, and the interest being aroused by a new course in Clinical Photography being offered this year in London.

Mid-South: This new chapter is keeping up the pace with which it was started a few months ago. Not only did members spend a day together in August (an "informal session" it is stressed), but they produced a five-page issue of "The Southerner" – the Mid-South's News Publication — giving their activities in detail, plus several short and valuable articles on photographic techniques. The session was held in Little Rock, where the members visited several hospital photographic departments, and enjoyed much good food and serious photographic discussions together. October 17, at Vanderbilt University School of Medicine, along with reports on BPA activities in general and the Los Angeles Annual Meeting in particular, a new Photographic Paper Safe was demonstrated by Mr. William H. Runge, of the Kennedy V.A. Hospital in Memphis. Dr. John B. Youmans, Dean of the Vanderbilt Medical School discussed the value of medical illustrations; Mr. Roy Andrews explained the workings of the retinal camera, and Mr. Luther Self showed a motion picture made with the Zoomar lens, which he further explained. Two Loving-Cups were presented, to Mr. Robert Waldeck and to Miss Susan Wilkes, for the best medical photograph and the best medical illustration respectively, in a contest which had been announced several weeks previously. To cap a highly successful meeting, the group adjourned to the Thayer V.A. Hospital in Nashville for a trip through Mr. Homer Jones' photographic department. As further evidence of Chapter progress, Chairman Gravesen announced the addition of six new active members.

New York: September 24, chapter members met in their usual start-of-the-season informal, social gathering at Cornell University Medical College. Chairman Jerry Weinstein outlined plans and ideas for the coming year, Mr. Warren Sturgis told of the recent BPA Annual Meeting, two short medical films were shown, and refreshments were served. October 22, Mr. Lewis W. Koster, from the College of Physicians & Surgeons of Columbia University, spoke on "Photography of Paper Chromatograms", and Mr. David Lubin, now at the Bronx V.A. Hospital, repeated the interesting demonstration of "A Simple Reflector for Near-Axial Illumination", which he had given previously at Los Angeles. Mr. Harry Parker, President of American Speedlight Corp., presented a new circular flashtube which he had developed, and Mr. Sidney Shapiro projected and discussed a short motion picture entitled "This Little Pig Went to Market". The Bulletin of this Chapter continues to inform the members of many interesting photographic facts, and events around New York City.

Rochester, N.Y.: October 20, the first meeting of the year was held in the Color Room of the George Eastman House. Mr. H. Lou Gibson presented "Highlights of Paper on Photomacrography of Insects", and gave a resume of his trip to the BPA Annual Meeting in Los Angeles.

Southern California: September 17, immediately on the heels of running their highly successful BPA Annual Meeting, members again got together for a Chapter Meeting. They saw a stereo motion picture, "Bronchovascular Anatomy", made by Dr. Ernest Rosenthal of Yale University School of Medicine, and heard a discussion on film editing by Mr. Edward N. Hamilton, of the College of Medical Evangelists in Los Angeles. Mr. Hamilton threw in for good measure a demonstration of "A & B Roll Editing".

Texas: May 23, a full report of this, the Annual Meeting of the Chapter, was not available for the previous Journal, but it can

now be offered. Held at the University of Texas Medical School in Galveston, the program, under the direction of Mr. Lloyd Willard, opened with a welcome by Dr. D. Bailey Calvin, Dean of the University Medical Branch. Mr. George Lefeber presented a paper on "Movies Through the Phase Microscope", and conducted a tour through the tissue culture laboratory. Mr. Wynne Eastman then demonstrated "Photography of Gross Specimens". After dinner a successful "Movie Clinic" was conducted, at which a number of members present their recent films. September 12, the Fall Meeting was held in Dallas, featuring a report on color TV for hospital use, and a demonstration of photographic equipment. A more complete report will follow in the next Journal. The Texas Chapter deserves continued commendation for its excellent and informative News Letter.

Upper Midwest: September 26 and 27, the Fall Meeting was held at the V.A. Hospital in Des Moines, Iowa. The many interesting papers and demonstrations can merely be listed in this column for reasons of space. Saturday afternoon: "Address of Welcome" (W. B. Nugent); "Duplication of Positive Color Transparencies" (J. K. Brown); "Method and Illuminator for Radiographic Reproduction" (H. T. Toenniges); "A Medical Exhibit — A Modern Concept" (B. J. Allison); "An Apparatus for Close-up Stereophotography" (H. G. Swift); "Print Quality" (E. Lynn Baldwin); "Magnetic Sound Recording on 16mm. Film" (R. Kent). Sunday morning: "Closed Circuit Television" (D. P. Minnich); "Stereo Motion Pictures" (T. R. Schinzel and H. L. Forsyth). At the dinner Saturday evening Mr. Leo C. Massopust presented his favorite topic, "Infra-red — Its Medical Photographic Significance and Applications". This chapter is another whose interesting publication, "Photo News", reports members' activities, reviews recent books and articles relative to biological photography, and in general serves as a stimulus to a widely dispersed membership.

Wisconsin: August 13, although this chapter is still in the process of formation, mention should be made of an enthusiastic organizational meeting held at Columbia Hospital in Milwaukee, attended by some 60 persons. There is no question but that this group will be well able to entertain us at the 1955 BPA Annual Meeting.

ACTIVITIES OF MEMBERS

Charles Hale, Dominion Museum, Wellington, New Zealand, kindly sent us a photocopy of an illustrated communication of his published in the Journal of the Bombay Natural History Society, Volume 51, No. 3, 1953, entitled Notes on the Photography of Fossils, with Special Reference to a Specimen of Indobatrachus from Worli Hill, Bombay The paper demonstrates the value of Mr. Hale's vertical illumination method where the absence of shadows can often reveal structural characteristics not evident in pictures taken with oblique illumination.

Dr. A. D. Bensusan, Johannesburg, South Africa, reports that he and Dr. P. Keen had an exhibit of medical photographs at the last Medical Congress in Johannesburg. The exhibit consisted of 25 prints from each of these two men. The exhibit made history in South Africa because it was the first known medical photographic exhibit to be held in that part of the world according to Dr. Bensusan. This is only one bit of evidence to indicate that medical photography is on the up-swing in South Africa. Mr. Abe Shewitz, Department of Medicine, Witwatersrand University, South Africa, is in England working with BPA member Robert Ollerenshaw of Manchester to learn the latest developments in medical photography in Great Britain so that workers in South Africa can benefit accordingly.

Zane H. Price, Department of Infectious Diseases, School of Medicine, University of California, delivered a paper on an apparatus for 3-D motion picture photomicrography at the annual meeting of the Photographic Society of America held in Los Angeles August 4 to 8.

Beginning January 1, 1954 the Journal Editor, Lloyd E. Varden, will become less actively engaged in the operation of Pavelle Color Incorporated in order to devote a greater part of his time to writing, teaching and consulting work. To a large extent this new move explains the lateness of this number of the Journal. For the time being Mr. Varden's address will remain unchanged.

Dr. Oscar W. Richards has continued his active lecturing program in spite of the ordeal of having to move from Stamford, Connecticut to the new location of the American Optical Company Research Laboratory in Southbridge, Massachusetts. Among his frequent lectures was an illustrated presentation on developments in phase microscopy during the years 1951-1953 at the American Microscopical Society Symposium (Sept. 8, 1953) on Modern Methods of Microscopy IV.

Mr. C. E. Engel, Guy's Hospital Medical School, London, England was one of the joint Secretaries for the 7th Congress of the International Scientific Film Association held in London, September 18-27, 1953.

Allen F. Hancock has kindly advised us that Miss Margaret L. Engel has been recently appointed to the Cardeza Foundation staff at Jefferson Medical College and Hospital, Philadelphia, as his assistant photographer. Miss Engel was formerly associated with William J. Taylor, Temple University Medical School and Hospital, Philadelphia. She received her training with Mr. Taylor and at the Temple University School of Photography.

Robert Krauss, Department of Medical Photography, the George F. Geisinger Memorial Hospital, The Foss Clinic, Danville, Pennsylvania reports that their exhibit entitled Dermatological Manifestations of Internal Disease was awarded the Certificate of Merit in the section on General Medicine at the June meeting of the American Medical Association, New York. Mr. Krauss was responsible for the award-winning color photographs and enlarged color duplicates contained in the exhibit. There were 84 5 inch x 7 inch color panels.

The exhibit was also shown at the Pittsburgh meeting of the Pennsylvania Medical Association (September 21-25) and at the Chicago meeting of the American Academy of Dermatology and Syphilology (December 19-21).

James E. Brubaker and Joseph D. Brubaker have been doing further research on endoscopic photography under the firm name of *James E. Brubaker Instrument Specialties*, Waukegan, Illinois. James E. Brubaker has been actively conducting the business of research and manufacture of equipment for all types of endoscopic still and motion picture photography. Joseph D. Brubaker has been doing fundamental theoretical research on the design of new endoscopic cameras and associated equipment.

As a result of the combined efforts of the Brubakers, a new 16mm versatile open-tube endoscopic motion picture camera has been designed and built under the auspices of the *Jacques Holinger Memorial Fund*. This camera features duplicate masks in the focusing telescope and the camera film box; a wide range of magnifications suitable for all types of open-tube endoscopes; a full frame area on the film suitable for photographing oral cavity and small field surgical operations; better illumination system; and a means of pressurizing the endoscopes used on the camera.

Notice Concerning the Institute for Scientific Films

Dr. Ing. Wolf, Institute fuer den Wissenschaftlichen Film, Bunsenstrasse 10, Goettingen, Germany, has sent your Editor copies of the publication entitled *Research Film* with a request that we bring this new periodical to the attention of BPA members. The publication is written in both German and English. It is very nicely printed and illustrated, and is to be highly recommended. Dr. Wolf has extended an invitation to all BPA members to submit papers for publication.

Note Concerning Motion Picture Symposium

Sy Wexler has suggested that we reprint the following from a paper written by J. A. Calhoun entitled Cold Storage of Photographic Films, PSA Journal, October 1952. Mr. Wexler was prompted to make this suggestion because of the great interest shown in the subject at the Motion Picture Symposium during the 23rd Annual Meeting.

"Film can be stored safely in any suitable refrigerator, *provided that the film is sealed in a vapor-tight package or container.* Refrigerators are frequently humid, particularly household refrigerators containing foods and liquids, and film stored in unsealed or porous packages will absorb moisture from the air and damage may result. Film which is not factory sealed in vapor-tight packages should

be placed in a can or jar which can be closed with an air-tight lid before it is put in the refrigerator.

"Household refrigerators usually operate at about 40 F to 50 F and are quite satisfactory for the storage of most films, with the proviso mentioned in the preceding paragraph. For specially sensitive films, or films to be stored for extensive periods, a deep freeze unit of the type available for frozen foods operating at 0 F to -10 F is recommended."

ANNOUNCEMENT OF NEW MAGAZINE

A new magazine devoted exclusively to tape and film recording has been announced by Mooney-Rowan Publications, Inc., Severna Park, Maryland. The title will be "Tape and Film Recording" and it will appear every other month. The subscription price for the six issues is $2.00, and Charter Subscriptions will be accepted at this rate up to the appearance of the second number. The slogan of the new periodical is "The Magazine of Sound Ideas." It will feature how-to-do-it articles in the hope of enabling readers to achieve greatest possible utilization of tape recorders and other forms of sound reproduction. Magnetic sound tracks for film purposes will be another constant feature. Departments will include New Products, Questions and Answers, Consumer Reports on New Equipment, etc.

NOTE ON BPA NEWS BULLETIN

The new Journal policy announced on page 16 of this number will allow the Editor much more flexibility in properly presenting original papers, general association news, product announcements and miscellaneous data. Members are requested to keep your Editor informed of anything new within biological photographic circles.

Papers on new techniques and equipment are particularly desired for the Journal. Personal items are required for the new bulletin.

MEMBER DEATHS

Samuel M. Corson, Phoenix, N.Y.
Julius Fuchs, M.D., New York, N.Y.
Allan A. Hammer, Franklin, N.H.
Albert M. Kessell, Bethesda, Md.
Major Bernard A. Satino, Orlando, Fla.

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(July through September, 1953)

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FELLOWSHIP PROCEDURE

Members may propose for Fellowship in the BPA other members whom they consider worthy of recognition. To be eligible for Fellowship a candidate must have been a member of the Association for five consecutive years and must possess one or more of the following qualifications:

Superior craftsmanship in still or motion picture photography of biological subjects. Ability in photographic research in new methods or materials.

(These require submission of evidence.)

Meritorious contributions to biological photography overall through sustained organizational work.

Two sponsors are required. The sponsors should be well acquainted with the candidate's work and should be ready to furnish the Board with details of his experience and achievements. Those who wish to sponsor a member whom they believe to be eligible should request a Fellowship Application form from the Secretary of the Fellowship Committee: Miss Anne Shiras, Photographic Department, Magee Hospital, Pittsburgh 13, Pennsylvania.

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FELLOWSHIP PROCEDURE

Members may propose for Fellowship in the BPA other members whom they consider worthy of recognition. To be eligible for Fellowship a candidate must have been a member of the Association for five consecutive years and must possess one or more of the following qualifications:

Superior craftsmanship in still or motion picture photography of biological subjects.
Ability in photographic research in new methods or materials.

(These require submission of evidence.)

Meritorious contributions to biological photography overall through sustained organizational work.

Two sponsors are required. The sponsors should be well acquainted with the candidate's work and should be ready to furnish the Board with details of his experience and achievements. Those who wish to sponsor a member whom they believe to be eligible should request a Fellowship Application form from the Secretary of the Fellowship Committee: Miss Anne Shiras, Photographic Department, Magee Hospital, Pittsburgh 13, Pennsylvania.

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